WOOD WORKING digest

NOVEMBER 1952

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A HITCHCOCK PUBLICATION

THE INDUSTRY'S *No.1* PUBLICATION

in

- Editorial Content
- Advertising Volume
- Effective Circulation

PUBLISHED MONTHLY SINCE 1898

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Spotpins are made in standard ⅞", 1" and 1⅛" sizes.

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Bores holes up

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to the center of 36″

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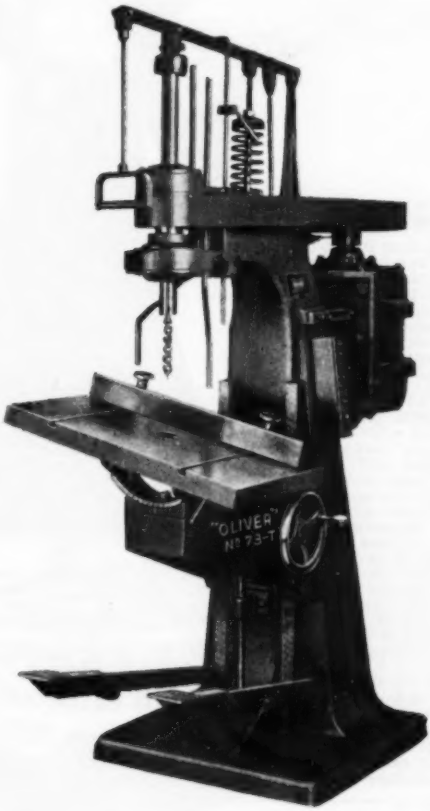

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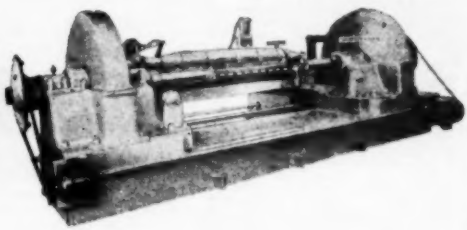

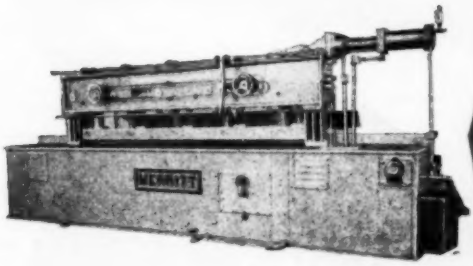

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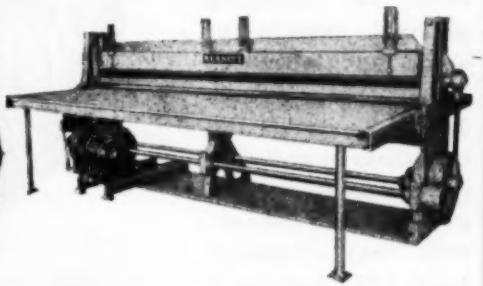

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NOVEMBER, 1952—OUR FIFTY-FOURTH YEAR

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PUBLISHED MONTHLY

Acceptance under Section 34.64, P. L. and R., authorized. Pontiac, Illinois

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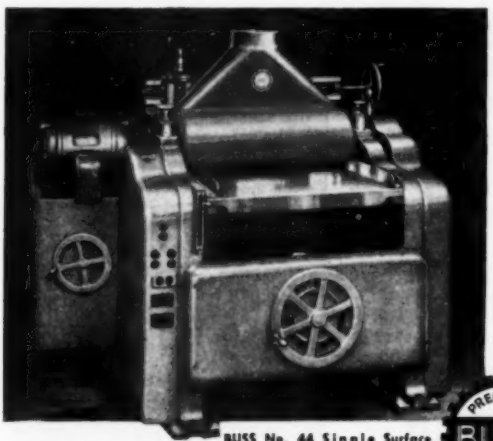
TO REPLACE WITH BUSS CABINET SURFACERS!

If you are operating your finishing planers at 15 to 25 feet per minute feed, you will find it downright good economy to replace them with our modern precision planers. BUSS planers today give beautiful knife work, smooth, precision planing at 50 to 75 feet per minute feed, and on some jobs as high as 100 feet per minute feed. Savings in planing labor costs, alone, will quickly return the cost of the machine; and, in addition, you will get that satin-smooth finished planing that saves on follow-up operations. BUSS planers, today, have many exclusive, advanced features which save time, reduce operating and maintenance costs and assure you finest of finished planing. Send for bulletins of the type and size required for your set-up and you will discover for yourself why it is just good, sound economy to replace your older machines with these up-to-the-minute planers.



BUSS No. 44 Single Surface Cabinet Planer. Wedge-adjusted bed. Cap.: 26" to 44" x 8"

The BUSS line contains small, medium and large capacity single and double surface cabinet planers. Also the No. 55 for double surfacing rough lumber.

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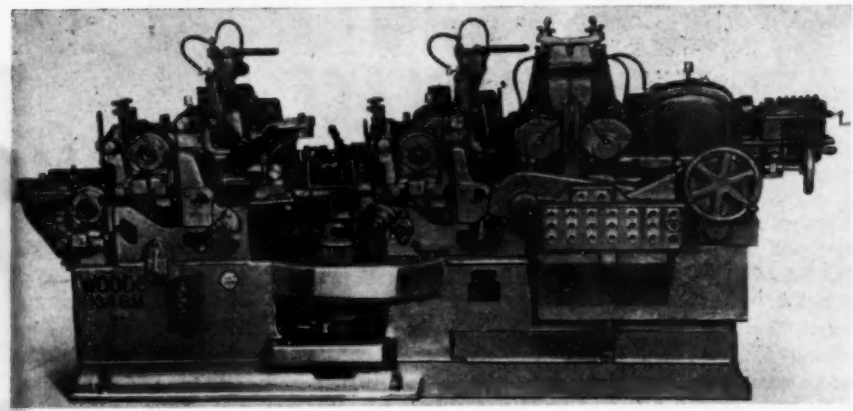

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Woods 134BM Five Head "LAG-BED" PATENTED Electric Moulder with Forced Feed Lubrication for Lag Bed and Centralized Lubrication for Feed and Oscillating Shafts

Woods 134BM five head design with second top head affords unusual flexibility, allows distribution of cut, results in its ability to meet today's demand for a better product.

Frame construction consists of three side frames mounted on a solid base and heavily girted at each end.

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That's right, mill after mill has told us that in addition to standing up under fast heavy speeds on the roughest, knottiest, sandiest lumber without losing their keen edges, these knives actually cut costs. OK PLANER KNIVES are made of the finest steel, hardened and tempered for the toughest edge you've ever seen. OK uniformity is so consistent that knives from different sets may be used together and still the lumber will have smooth and perfect finish without marks.

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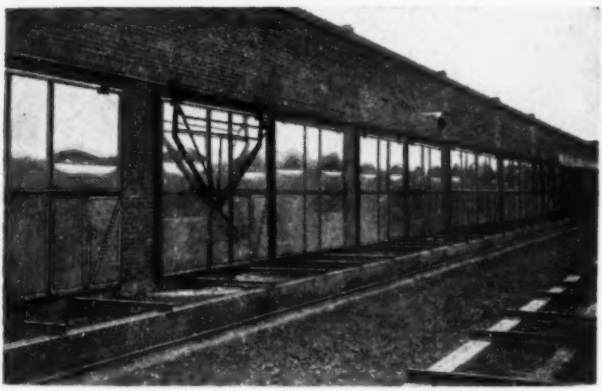

View of the Lane Company's long line of Standard Dry kilns, installed at the Company's big Altavista plant. World-famous Lane cedar chests get their start in this fine dry kiln battery.

Manufacturers of Internal Fan Kilns

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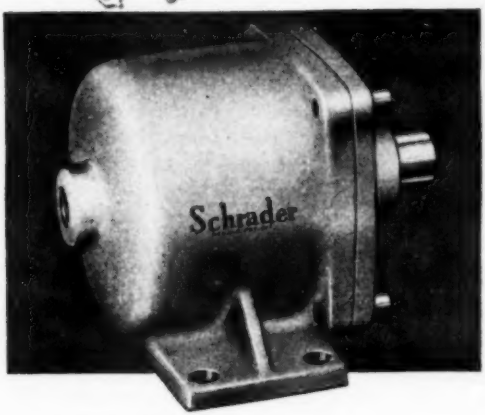
Let Schrader ClampAir apply high production techniques to your woodworking problems. In veneering . . . band edging . . . most gluing or other joining . . . or *any* holding operation . . . use the new ClampAir singly or in batteries to perform holding miracles.

For Schrader's ClampAir gives you speed and convenience for clamping such as you've never seen before. The ClampAir—actually a bantam but husky push-type air cylinder—gives you—*instantly*—any gripping force you want. Holding pressure is *steady*—never relaxes, yet can be applied or released in nothing flat.

Check with Schrader for full details on how ClampAir can make any holding operation a pleasure. Write, outlining the processes you use where ClampAir's fast, effective holding power will help—or fill out the coupon below.



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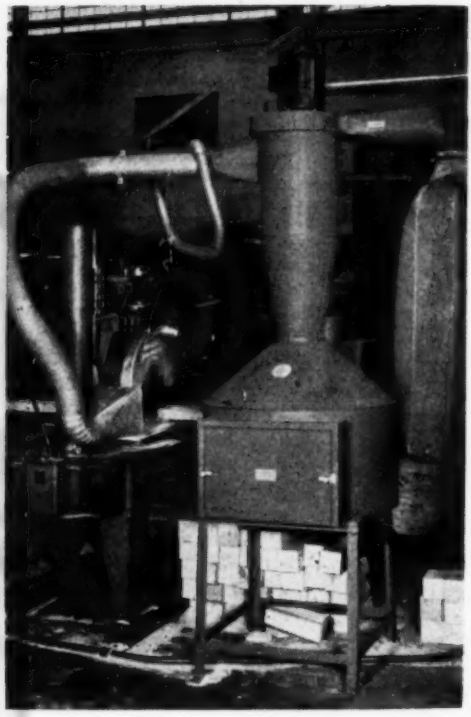

Keep the "chips *from* flying" on this swing saw.

The circular saw shown here is used for cutting hardwood timbers. Suction pipes attached to the wheel enclosure lead to a TORIT 13-FB Dust Separator. The heavier particles are removed by the cyclone unit, and fine dust by the after-filter.

This Torit installation eliminates the need of a central dust system, with its maze of expensive piping. Operating only when the saw is running, it cuts operating costs. Furthermore, it recirculates the cleaned air to maintain room temperatures.

Both cabinet and cyclone-separator type TORIT Dust Collectors are available in special purpose units with extra large storage reservoirs. Especially suitable for handling wood working dust problems, they offer real savings in installation, operating and maintenance costs. For details and the latest TORIT catalog, write:

Torit Dust Collectors are also available in self-contained cabinet type units for carrying away dust-laden air around grinding, cutting and polishing wheels.

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DE KALB DIVISION
THE RUDOLPH WURLITZER COMPANY
DE KALB, ILL.

"easy set-ups - lots of production"

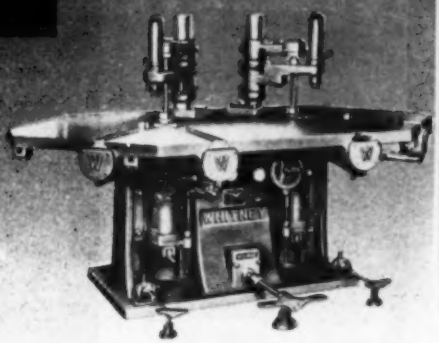
"trouble-free operation"

THE RUDOLPH WURLITZER COMPANY
J. A. Miller
J. A. Miller, Supt. of Mfg.
DeKalb Division

One of three Whitney Automatic shapers setting suite at Rudolph Wurlitzer Co., DeKalb, Ill. The shaper shown here is shaping veneer panels all around, for Wurlitzer cabinets.

The Rudolph Wurlitzer Co., world famous makers of musical instruments, have nothing but praise for the large production and smooth, uniform shaping received from their Whitney Automatic Shapers. Having operated Whitney Automatics for many years they appreciate their time-saving and cost-cutting features.

Whitney Automatics have the advantage of easy set-ups and quick change-overs making them ideal for short or long runs. Investigate them today for your important shaping operations.



Write for complete information or send samples of your work for our suggestions. Ask for Shaper Bulletin D11.

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the PERKINS GLUE LINE

PERKINS GLUE COMPANY — Lansdale, Pa. • Kitchener, Ont. • High Point, N. C. • Shawano, Wis.

Fast-Setting Corox Gives Strong Bond In Joint Gluing

Users of Perkins Corox liquid ready-for-use glue report that excellent joints are obtained even after short clamping periods. This excellent prepared form of vegetable glue has received wood fabricator's stamp of approval for a wide variety of gluing applications.

Assembly gluing is the primary place for use of Corox, but large quantities of this glue are also used in edge bonding of corestock. Cores

Perkins Corox liquid ready-for-use vegetable glue is excellent for edge gluing stock to be pressed in a clamp carrier as shown above. Samples of Corox are available to woodworkers.

Single Source For All Types of Glue

A single source for all wood adhesive requirements?

Glue-users — large and small — benefit tremendously when they can obtain all their glue room requirements from a single reliable source. Ordering is simpler, better service is made possible, transportation costs are reduced and other obvious benefits accrue to the glue user when a single source of supply is maintained.

Perkins Glue Company is the only major glue supplier offering the full range of resins, caseins, vegetable and prepared hide glues. This assures an unbiased approach on the company's part in offering you the right glue for a particular job and makes it possible for you to get as many different adhesives as you may need from one source.

The Glue Line

The regular editions of "Perkins Glue Line", external house organ of Perkins Glue Co., have not appeared in recent months for reasons beyond our control.

The publication will appear again in the near future as a quarterly and the several thousand readers on our mailing list will receive each edition.

Glue Powder Storage

Powdered resin or casein glues should never be stored directly on a concrete floor. Moisture from the concrete will considerably shorten the storage life of the resin or casein.

If the storage room floor is concrete, place boards underneath the drums as a precaution.

bonded with Corox may later be hot pressed in panel manufacture without a softening of the glue line.

While longer pressure periods are advisable where possible users of Perkins Corox have reported excellent joints after clamping times of as little as ten minutes.

In addition to fast set, Perkins Corox offers an unapproached advantage over other ready-for-use adhesives in that Corox joints get stronger with age rather than weaker as is the case with many other liquid adhesives offering a quick bond.

Perkins Corox—due to the elimination of mixing, heating, and other laborious and costly operations — is considered to be one of the most efficient glues ever offered furniture manufacturers.

Full information and test samples may be obtained from Perkins Glue Company, Lansdale, Penna.

Founded in 1899

Perkins Glue Company is one of the oldest firms serving furniture and plywood manufacturers. The Company was founded in 1899.

YOU CAN BE SURE...IF IT'S

DEVELOPMENTS IN MATERIAL AND METHODS
The use of tungsten carbide in machining wood and wood substitutes is not new. It has been demonstrated over a period of years that, in certain cutting operations, tungsten carbide has a marked, over-all superiority, compared with steel. It is only recently, however, that carbide makers, and tool manufacturers and users have pooled their know-how . . . have pooled their research, engineering, and field knowledge . . . in a genuine effort to improve carbide woodworking tools still further, and to broaden their application.
Results have been gratifying. Jobs, once deemed impossible, are now being done successfully with the improved carbide tools. The superiority of tungsten carbide is evident more than ever. And its application in cutting appears almost unlimited.
If you have a particular cutting problem . . . if you would investigate tungsten carbide . . . write the Cutter-head and Knife Division, Yates-American.
ates American
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Double Time SAVINGS

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BRANCH OFFICES: CHICAGO, ILLINOIS; HIGH POINT, NORTH CAROLINA; MEMPHIS, TENNESSEE; PORTLAND, OREGON.
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10 KW-6.8/13.6
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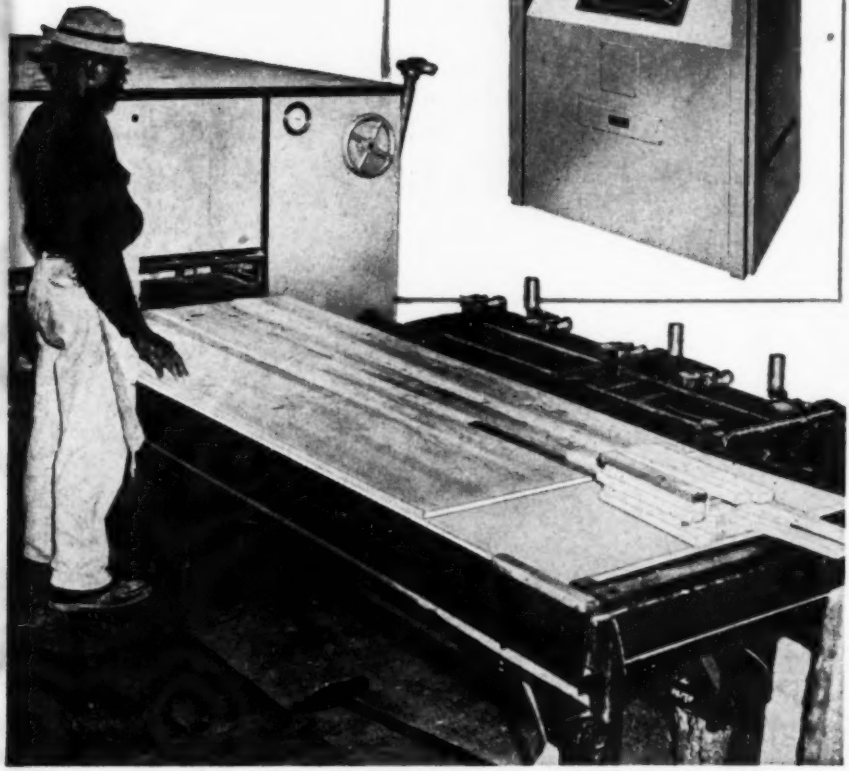
generator designed
for wood gluing.



A Westinghouse 10KW-5 MC generator and a Weldon-Flinchbaugh panel press produce phenomenal savings in costs and materials at Bradley Plywood Co.

Part-Time SAVINGS

$26,000

A YEAR!

RF gluing equipment is used in new, efficient and productive ways by Bradley Plywood Company, Savannah, Georgia. For one day a week Bradley's RF equipment glues scrap wood salvaged by them to make lumber core panels, desk-top cores and other items.

On scrap-wood gluing alone, Bradley saves $26,000 a year!

Bradley spends the other four days a week on RF gluing of core-stock panels from standard size lumber. With RF heating, production has tripled, costs have been halved.

For full-time operation, the $26,000 scrap-wood savings plus an annual saving of more than $36,000 in normal operations paid for the installation in less than three months. There have been added benefits: fewer rejects, less glue, less planing, less floor area.

Today, scarcities demand savings. For savings information, call your Westinghouse representative. Or write Westinghouse Electric Corporation, Department W-3, 2519 Wilkens Avenue, Baltimore 3, Maryland; ask for the booklet B3946B covering "*RF Heating for the Woodworking Industry.*"

Westinghouse

RF HEATING

J-02225

for every Saw-Sharpening need

This makes sense: Simonds Sawmakers *should* know how to make the finest saw files made . . . and experienced sawfilers know that they do. That's the bonus in know-how you get with every "Red Tang" File you buy. Simonds makes one quality only . . . Grade A. And that quality is double-checked by the Simonds "Prover Test." Find out for yourself how much easier it is to keep your saws sharper with Simonds "Red Tang" Files. Order from your Industrial Supplier today.

SIMONDS
SAW AND STEEL CO.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que.
Southern Service Shop in Meridian, Miss. (formerly J. H. Miner Saw Mfg. Co.).
Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Simonds Abrasive Co., Phila., Pa. and Arvida, Que., Canada

Have YOU Considered These Extra Profit Possibilities?

Perhaps you are already making money from waste wood, in addition to burning it as cheap fuel. But have you explored ALL the possibilities suggested by the list at the left?

In any of the uses for which you may sell your waste, most important is its proper reduction and preparation. Efficient, low-cost handling — consistent uniformity — minimum equipment investment — economical power requirements and maintenance — all are factors that can mean the difference between profit and loss.

These are the things with which Williams can help you! Many years of experience in designing equipment especially for profitably hogging, grinding, sizing and handling of wood waste are at your service without obligation.

A FEW PROFITABLE USES FOR WASTE WOOD

AS WOOD FLOUR FOR:

- Linoleum filler
- Plastics filler
- Composition flooring
- Artificial wood
- Molded products
- Insulating brick
- Glue extender
- Granulated soap

—and many other specialized products

AS SAWDUST FOR:

- Hardboard
- Insulating wallboard
- Soundproofing board
- Gypsum compositions
- Animal bedding
- Absorbent products
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- Hogging, Grinding & Shredding machines of all types
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OLDEST AND LARGEST MANUFACTURER OF HAMMER MILLS IN THE WORLD

Step on it for more production

PORTER 43-20J Automatic Hydracut Saw

FOOT PEDAL CONTROL ENDS OPERATOR FATIGUE

Increase lumber production in your plant with these Hydracut Saw set-ups.

1.

Standard Set-up. Hydracut Saw and tables.

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Hydracut Saw in single line conveyorized rough mill set-up.

3.

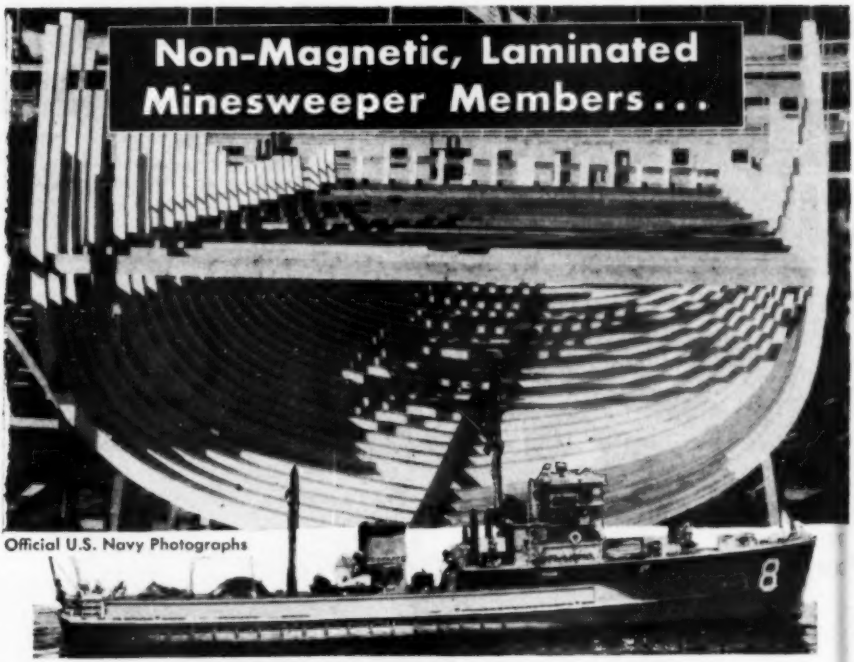
Hydracut Saws in double line conveyorized rough mill set-up.

The Porter 43-20J Automatic Hydracut Saw saves hours of labor . . . enables any cutting room operator, regardless of age, to cut more lumber per day by eliminating tiring hand operation. Operator simply positions the lumber against the adjustable cut-off stops . . . and presses the electrically operated foot control. The saw blade, mounted on a hydraulically operated carriage, *automatically* moves forward to make the cut and *automatically* returns. Fatigue from manual "push-pull" operation is gone.

Stroke length is quickly adjusted by a convenient lever. Cutting speeds range from 0 to 45 cuts per minute.

The new Porter Bulletin 43-20J-1 fully explains the Automatic Hydracut Saw. *Send for your copy today.*

C. O. PORTER Machinery Co.
668 Front Ave., N.W., Grand Rapids 4, Mich.



bonded with Penacolite® Adhesives for outstanding strength and performance

The very nature of their service demands that U. S. Navy minesweepers be constructed of durable, non-magnetic materials. Wood has been chosen for the structural members of these ships, and Penacolite Resorcinol Adhesives are proving very popular in bonding the laminated timbers.

Resilient laminated wood members prove much more shock resistant than *solid* timbers . . . and are stronger, size for size. Larger timbers are possible through lamination than could be fashioned from the largest trees available. They do not require long seasoning time and are easier to shape. The use of laminated members reduces the necessary number of fastenings and joints in the frame of a ship, too.

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Let us analyse *your* bonding problem and recommend the right Penacolite Adhesive for your particular job. No obligation.

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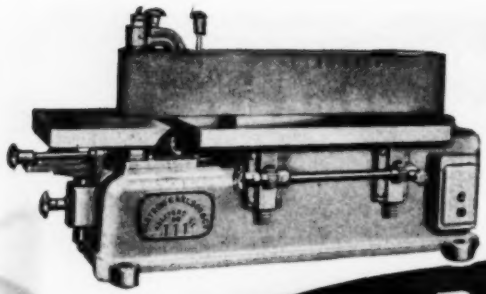

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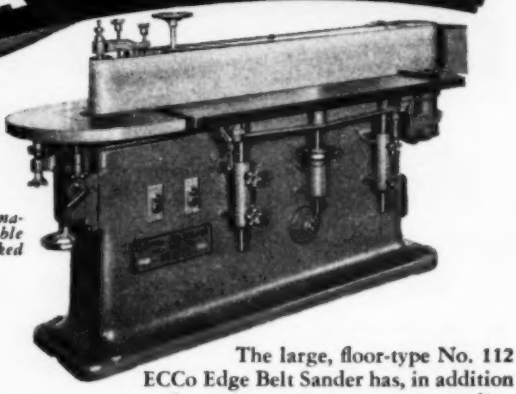
No. 111 is furnished as a bench model or on a sturdy floor stand.

EDGE BELT SANDERS

"PROVIDE FOR TOMORROW BY BUYING TODAY"



No. 112

No. 112 is a single-side machine, No. 112A has double backboards and can be worked at from both sides.

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Learn all about the interesting details of ECCo Edge Belt Sanders. Write today for copies of Bulletins 111 and 112.

CONDENSED SPECIFICATIONS		
	No. 111	No. 112
Work Table Size..	8"x26"	11"x60"
Abrasive Belt Travel FPM.....	3200	4400
Vertical Adjustment of Table...	5"	4"
Height of Table in Lowest Position.	13"	35"
Space Required (With End Table)	20"x52"	28"x92"

The large, floor-type No. 112 ECCo Edge Belt Sander has, in addition to many refinements, an important outstanding feature — the oscillating backboard, the motion of which is synchronized with the oscillation of the belt. This results in a cooler-running belt, longer belt life, and greater sanding power through higher efficiency. The smaller No. 111 machine is a portable unit, available for bench mounting or on its own floor stand, and ruggedly built for *heavy duty* service. The need for a portable machine is amply demonstrated by the large number now in service in prominent woodworking plants of many kinds.

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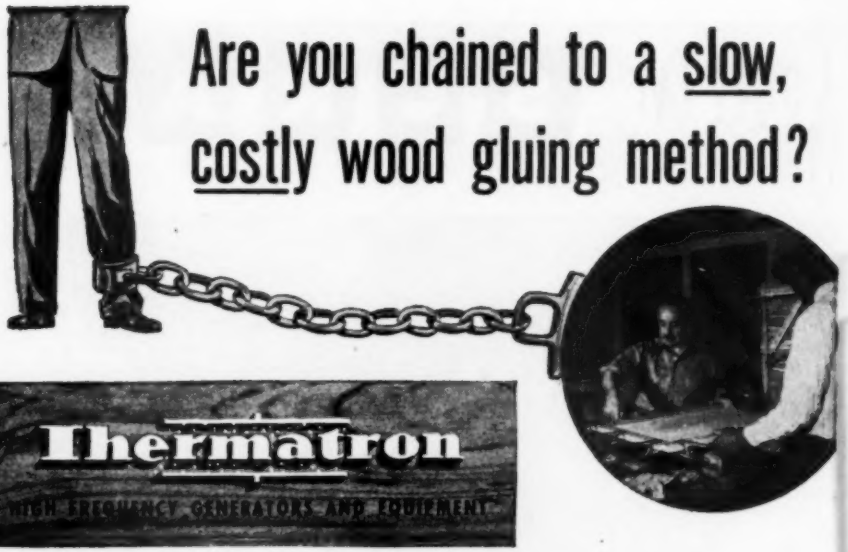

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. . . For Permanent Wood Bonding in a Matter of Seconds!

Seen in the jig is an entire cabinet assembly to be glue-set electronically by THERMATRON in only 30 seconds. The bond is stronger than the wood itself by actual test! Hidden in the background is the 3 KW generator which masterminds this job.

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Standard stock generators available from 500 Watt to 20 KW output, operating on 110 or 220 volt lines. Larger size generators up to 100 KW can be supplied for larger requirements.

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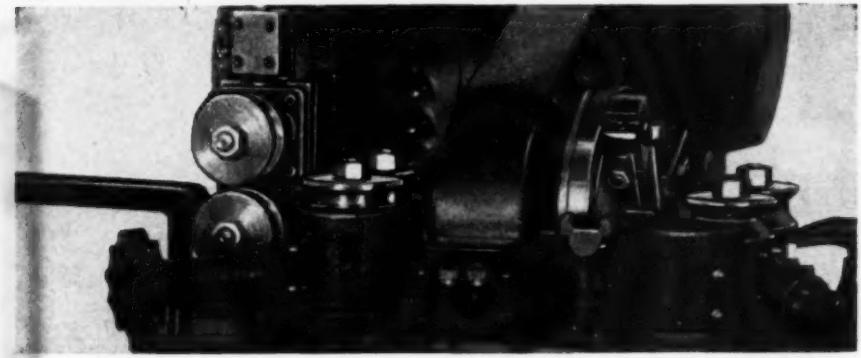

feed out PROFIT

Convert your scrap trimmings and edgings to profitable wood turnings with a Hawker Rod and Dowel machine: the only dowel machine with self-centering horizontally mounted infeed rolls that produce uniform rounds from rough sorted scrap. Hawker's new auxiliary vertical outfeed rolls greatly reduce chattering, twisting or breaking within the cutterhead and eliminate malformed dowels. Hawker's new quick adjusting, All Steel Cutterhead gives uniformly good surface finish — holds o.d. to close tolerances — produces rounds at high feed speeds hour after hour. Matched sets of Hawker quality steel knives are precision ground on all surfaces to assure better finish and two to three times more production between grindings. Write for new catalog.

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Saved $72,000 on one job!

with a STANLEY ROUTER

No. R22—2 h.p. Router

Cutting 4500 lineal feet of these huge Gate Quoin Posts for canal locks promised to be an expensive job for a department of the Government. The best quote obtainable was $17 per lineal foot. However, by setting up a Stanley Heavy Duty Router on a simple fixture the Posts were cut and shaped for approximately $1 per lineal foot. A total saving of about $72,000 on the job!

This is but one example of the adaptability of Stanley Routers. There are literally thousands of applications for these versatile tools in every woodworking shop. And many times, you'll find that Stanley Routers pay for themselves on the very first job.

Ask your Dealer to demonstrate the Stanley Router best suited to your needs—portable and stationary models available in 8 different sizes from 1/7 h.p. to 3 h.p. All have the famous Stanley quality construction. Write for complete Catalog. Stanley Electric Tools, 433 Myrtle Street, New Britain, Connecticut.

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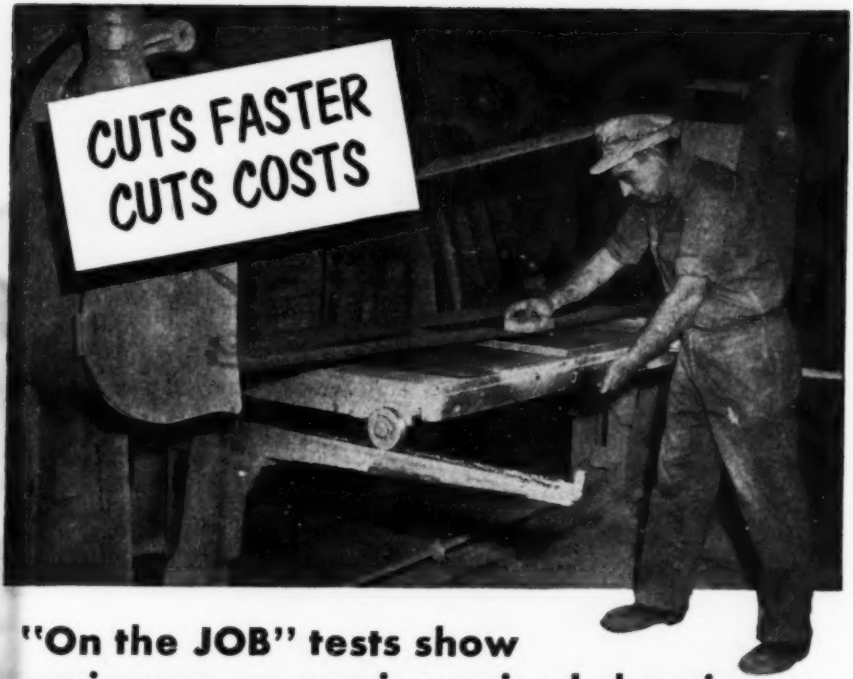
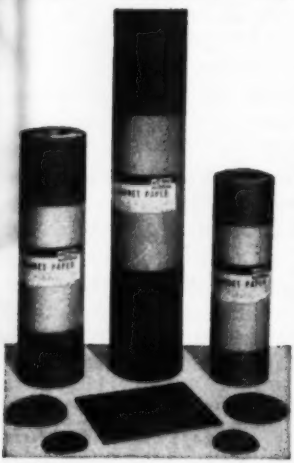


"On the JOB" tests show savings over premium priced abrasives...



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Customers tell us that "on the job" tests have proven Mid-West Resin Seal Garnet to be superior to other coated abrasives costing much more. That is why we urge you to make a test run with Mid-West and compare it with the brand you are now using.

Designed specifically for the woodworking industry, Mid-West Resin Seal Garnet material is made with medium or heavy weight paper and all cloth backings, and flexibilities in belts, sheets, rolls or discs . . . or in any other standard form.

Why not let us show you how we can cut costs on your sanding operations? There is a Mid-West field representative ready to serve you. Write us for his name.

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EXECUTIVE OFFICES:
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Plants in Owosso, Michigan and Rochester, Pennsylvania

DE WALT SAFETY POWER FEED GIVES YOU

The De Walt Safety Power Feed helps you to cut faster with greater precision. You rip, bevel rip, plough, groove, rabbet, shape and mould at speeds up to 90 feet per minute.

Each cut becomes a model of perfect workmanship, because material is fed at a constant rate...automatically. This eliminates marks on wood caused by uneven hand feeding. You start the material...the power feed follows through flawlessly.

Moulding jobs can be done by one man—instead of two—enabling you to cut labor costs. A special device prevents kick-back accidents, gives you undreamed-of safety.

The De Walt Safety Power Feed has its own motor, and end rollers. Operates at three speeds—30, 60 or 90 feet per minute. See your De Walt dealer for demonstration. Write for full details to De Walt Inc., Dept. J-11, Lancaster, Pa.

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A subsidiary of AMERICAN MACHINE AND FOUNDRY COMPANY, New York

INCREASE PRODUCTION as much as 100%

Lift Installed at	Production Increase
Double Surfacers	40% to 75%
Rip Saws	30% to 60%
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INSTALL LEITELT LUMBER LIFTS

A glance at the above figures, FURNISHED BY USERS, proves how Leitelt Lumber Lifts increase production.

You can get these profitable increases in production and save the labor costs of one or two men with a Leitelt Lumber Lift in your plant or yard. Leitelt Lumber Lifts are built in a full range of capacities for handling loads from three to thirty tons easily and safely.

Let Leitelt engineers solve your production problems. Write Today.

Also Manufacturers of Power Transfer Cars Car Pullers Power Driven Turntables Subcars and Leitelt Swing Tables

LEITELT IRON WORKS

"Pioneer Builders of Lumber Lift Equipment"

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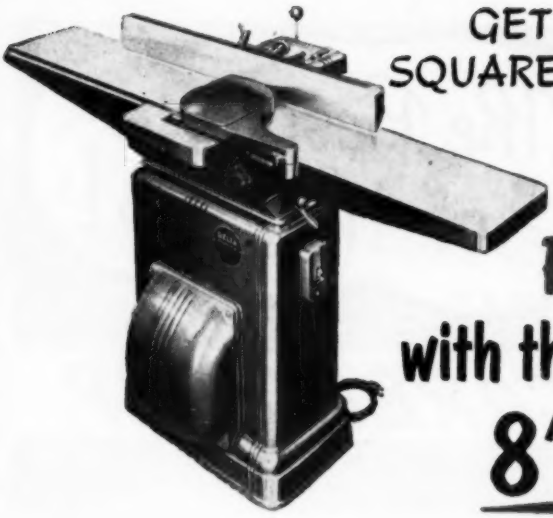
A typical modern installation showing a Leitelt Lumber Lift feeding two cut-off saws. This is how one of the largest table manufacturing plants in the country has increased their production at the vital point where material starts to flow through the plant.



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33⅓% FASTER with the DELTA 8" Jointer

FAST—with four cutting knives at 4100 r.p.m. the Delta 8" jointer cuts one-third faster than a 3-knife machine.

ACCURATE—and *stays* accurate; built-in precision for years of steady, hard use.

BIG CAPACITY—plenty of work-area; fence tilts 45° either way, adjustable in any position.

SAFE—practical cutterhead guard provides maximum protection; working parts easily accessible, safety type switch easily locked.

MONEY SAVER—rigid construction, lubricated-for-life ball bearings, speed and accuracy all mean exceptionally low operating and maintenance cost.

The DELTA BIG 5 Woodworking Tools

Radial Saw—4 models
Circular Saw—8", 10", 12"
Band Saw—14", 20", 36"
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Jointer—6", 8"

These tools are described in Catalog AB-51—use the coupon

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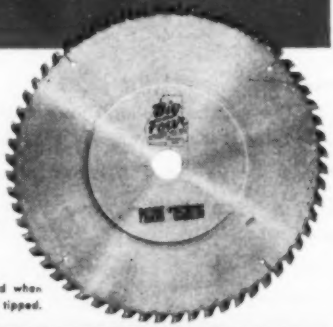
NEW DESIGN
SAW BLADE

TYPICAL PRICES

Diameter	Teeth	Price
12"	60	$149.50
14"	60	$153.50
16"	60	$157.50

World's most satisfactory blade for smooth splinter and chip free finished. Especially designed for trimming, mitering and cross cutting fancy veneered panels, ply woods, decorative laminates and solid woods.



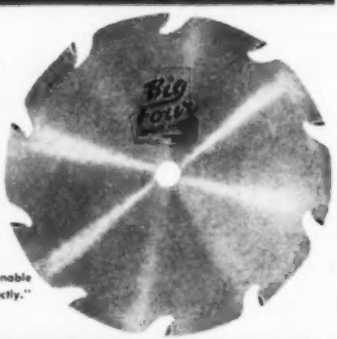
Expenses are clipped when it's Big Four Carbide tipped.

BIG 4 SAFETY
SAW BLADE

TYPICAL PRICES

Diameter	Teeth	Price
5⅜"	6	$14.40
8"	10	$18.60
10"	10	$24.30
12"	12	$31.00
14"	14	$34.20

Revolutionary in design, performance and PRICE. Anti-kickback features mean less operating effort; carbide tips give longer life. Blades for all sawing operations available 5⅜" to 16" diameters. For portable electric, hand- or chain-fed machines.



"Ask your local dealer—if he is unable to supply you, contact us directly."

Big 4 produces saw blades for every purpose, from school room manual training to large industrial projects.

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For free comprehensive booklet write to: Big Four Carbide Tool Co., 5938 Carthage Avenue, Cincinnati 12, Ohio.

Comments from THE NATION'S CAPITAL

By Arnold Kruckman
Washington Correspondent

Irving Rubenstein is the new head of the Building Materials Branch, OPS. Rubenstein is a New Deal career man in the Federal Government.

Alaska's first plywood manufacturing plant will be built near Juneau with a $600,000 RFC loan negotiated by the Small Defense Plants Administration. RFC supplied $35,000, via SDPA, as working capital for Polson Lumber Company, Polson, Montana, operating a sawmill. The loan was given to supply an inventory of logs to permit the mill to operate during fall and spring.

Israel's ambassador in Washington is responsible for the information that 1.1% of immigrants to Palestine are engaged in primary wood industries and 1.3% in other woodworking. He also told Washington that in the ancient Biblical town of Tiberius a plywood factory is now in operation. The building is made of sawdust, scrap lumber and concrete. This material saved much labor and about 50% of timber scaffolding normally required. The structure covers 40,000 square feet.

Library of Congress had word from the state librarian of California that wooden canopies were erected over all the entrances of buildings in the "killer earthquake zone" during July and August in the Bakersfield area of the San Joaquin Valley of California. The wooden covers saved thousands from injury by falling debris.

Colorado offers a particularly fertile field for small business enterprises, especially for undertakings engaged in woodworking and metalworking. More than 75% of all manufacturing plants in Colorado have less than 20 employees, while those with 50, or less, account for 90% of all manufacturing employment.

Before the end of November, OPS will issue a special small business regulation to exempt certain groups of retail and service establishments from price control. The exemption will be on

the basis of dollar volume. The House Small Business Committee has long urged OPS to free smaller concerns from the burden of record keeping and multiple regulations.

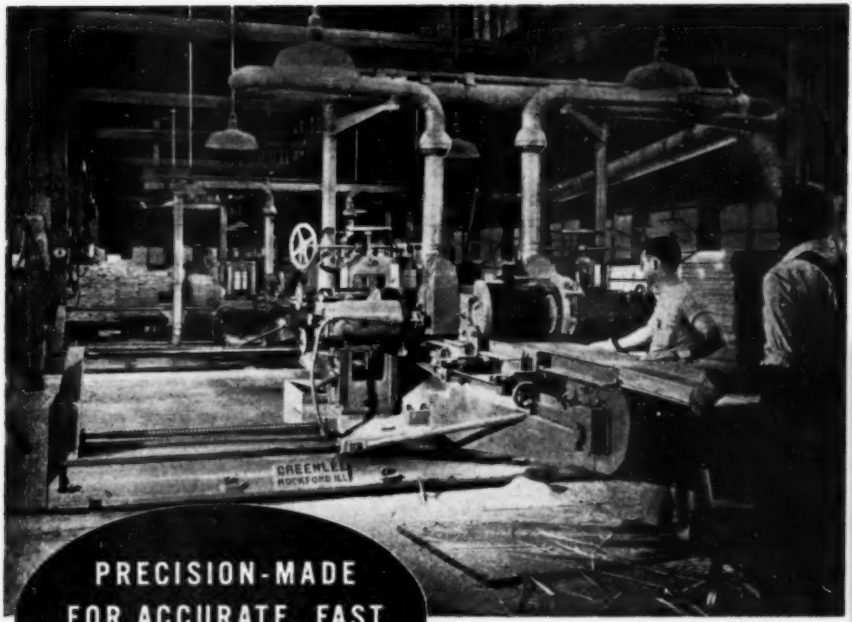
Manufacturers, wholesalers, and others, have been given authority to pass through outbound freight costs. The regulation, SR-35, to CPR-22, etc., was issued early in October. It really will help to remove the burden of outbound freight costs from those who are now compelled to pay them; but it will be very wise for those who wish to operate, under the new regulation, to get a detailed and competent explanation from the nearest OPS office, or through the pertinent Industry Advisory Committee.

Bureau of Labor Statistics reports 11 leading wood furniture manufacturing centers averaged from $1.02 an hour in Winston-Salem and High Point, N.C., to $1.59 in Los Angeles. Earnings of those who account for from 80% to 85% of the industry's production work force, exceeded $1.25 an hour in eight of the areas studied. Case goods assemblers, hand sanders, sprayers, machine off-bearers, earned from 93¢ to $1.79 per hour. Paid holidays, ranging from one to six days a year, were provided most of the wood furniture production workers.

Early in the year the Association of Manufacturers of Woodworking Machinery suggested a commercial standard for stock Ponderosa pine insulating glass windows and sash, which was circulated by the Bureau of Standards to manufacturers, distributors and other interested groups for review and comment. The standard provides minimum requirements in the 1-⅜ inch thickness to accommodate nominal ½ inch thick insulating glass; also, for stationary sash in the 2½ inch thickness to accommodate nominal one-inch thick insulating glass.

Entomologists of the U. S. Department of Agriculture report that a wide-spread epidemic of the Engelmann spruce beetle has caused one of the most damaging forest infections ever to occur in the northern Rocky Mountains. Spruce stands valued at $50,000,000 as stumpage are already infested. The epidemic appears centered in the Kootenai National Forest in northwestern Montana. Beetles multiplied in great numbers in spruce timber uprooted by a violent wind storm late in 1949 which swept across the timber belt of northeastern Washington, northern Idaho and western Montana. Lumber companies are devoting logging and sales efforts to salvage and market unprecedented volumes of spruce within the next 36 months.

John B. Veach, President of the National Lumber Manufacturers Association, is chairman of the newly revamped Lumber Survey Committee. This committee makes a quarterly report to the Secretary of Commerce about current status in lumber supply and demand. Other committee members are: Harold E. Holman, Deputy Director, Lumber and Wood Products Division, NPA; Edward W. Conklin, President, National-American Wholesale Lumber Association; Clyde A. Fulton, President, National Retail Lumber Dealers Association; Arthur S. Horner, President, Associated General Contractors of America, Inc.; Thomas S. Holden, President, F. W. Dodge Corporation; Mathias W. Niewenhous, Forest



GREENLEE DOUBLE CUT-OFF SAW IN OPERATION AT STATESVILLE PLYWOOD AND VENEER COMPANY

PRECISION-MADE FOR ACCURATE, FAST PRODUCTION

...Greenlee No. 542 Electric Double Cut-Off Saw

"We wish to congratulate you on the fine double-end trim saws recently placed in operation here. They show beautiful workmanship and they really do a fine job."

That's what Mr. Elbert M. Shelton, president of Statesville Plywood and Veneer Company, Statesville, N. C., has to say about their new GREENLEE No. 542 Cut-Off Saws.

Reasons are many why the GREENLEE No. 542 does such smooth, accurate work . . . and at high speed! First is because each one is made so sturdily . . . built to handle the work with ease and stand up under production requirements at high speeds for a long, long time.

Next is its "watchwork like" construction and the precise setting arrangement which permits making adjustments to a fraction of 1/64". Accurately graduated dials show the exact setting of the movable housing, and the machine cuts exactly to the size indicated by the dials.

And remember, too, the GREENLEE No. 542 is extremely versatile. In addition to its double cut-off operations, with attachments it will handle your shaping, relishing, tenoning, dadoing or scoring.

Get all the details on this precision machine today. Write Greenlee Bros. & Co., 1871 Twentieth Avenue, Rockford, Illinois.

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Products Advisor, DPA; George R. Birkelund, President, Baker Frentress and Company.

The lumber market continued to show lack of strength the second quarter of 1952, according to Secretary Sawyer. More business was expected late this year. Gross mill stocks of lumber were estimated to be 17% above the levels at the end of June, 1951. Retail yard lumber stock declined 6%.

Census reports softwood plywood production for August, 1952, totalled 279,531 M square feet. Veneer production by hardwood and plywood manufacturers amounted to 2,526,000,000 square feet during the second quarter of 1952. Census reports red cedar shingles and shakes production (in squares) for August, 1952, 291,840; shipments (in squares) 303,921.

Millwork Industry Advisory Committee recently discussed with OPS a draft of a proposed regulation to spell out dollars and cents ceiling prices on direct mill sales of most standard items of stock millwork, and to provide means for manufacturers to determine individual ceilings on stock millwork specialties, assemblies, hollow core doors and other items. A long list of items and species of wood were discussed in detail.

CPR-165 provides price relief from higher purchase costs for imported lumber, logs and allied wood products. Major source of supply is Canada, accounting for 90% of lumber imports and 65% of log imports. It is best to consult the nearest OPS office for details. GOR-34, OPS, exempts from price control all softwood and hardwood logs and bolts, except excelsior bolts, produced in the United States east of the 100th meridian.

Lumber Wholesalers Industry Advisory Committee discussed with OPS a new regulation to be additional to GCPR, SR-29 or SR-87. OPS proposes to produce tailored regulations (1) for wholesalers, (2) retailers and (3) lumber distribution yards. CPR-171 provides ceiling prices on most poles and piling produced in the eastern half of the United States. The new ceilings are on an average 15.6% higher than ceilings established by GCPR in January, 1951. The Wooden Box and Shook Industry Advisory Committee expects a tailored regulation for ceiling prices for their products. The regulation will provide for formula pricing of most wooden containers and shook. The Slack Cooperage Industry Advisory Committee recommended that its products be covered by the proposed formula ceiling price regulation for wooden containers. The Hardwood Distribution Yards Advisory Committee asked OPS for a regulation patterned after MPR-467, issued for the industry by the war-time OPA. Industry members said it is impractical to determine ceilings under SR-87 to GCPR.

Under GOR-34, Amendment 1, OPS exempted from price control fancy face wood veneer; walnut lumber and gun stock blanks; wooden mine materials, except certain Pacific northwest products; primary producers sales of untreated northern white cedar, jack pine and Norway pine poles and piling produced in the United States east of the 100th meridian, when the poles are sold for use as supports for transmission lines, and the piling for use as foundation for construction purposes; also primary sales of untreated fence posts. The exemptions were effective September, 1952.

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DRIVES FASTER—SAVES ASSEMBLY TIME
+ HOLDS TIGHTER—FEWER SCREWS NEEDED
+ SAFER TO USE—FEWER REJECTS
+ DRIVES STRAIGHT—SAVES RESTARTING SCREW
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IT ALL ADDS UP TO

Important Savings for you!

You can identify **TWIN-fast** by its relieved shank and twin thread

Get all the facts on this new screw that fastens wood to wood, metal to wood, or plastic to wood. It has four new basic improvements.

1 Relieved shank diameter
2 Parallel twin threads
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Can be furnished in either Slotted or Phillips Recessed Heads.

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The Faster Driving...Cost Cutting Fastener

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TABLES that work better sell better. Wabash Slides engineered to the table assure smoother operation, easier upfitting and offer many other important advantages. You can have your table construction styled by specialists at no extra cost. We manufacture all types of Slides, Folding Leaf Equipment, and Top Locks.

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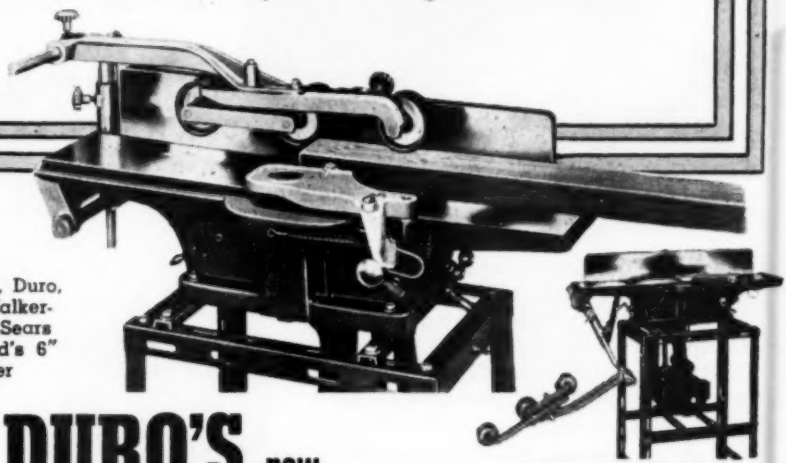
Write **Today for Free Engineering Consultation Blank**

B. WALTER & COMPANY, INC., WABASH, INDIANA

Walter of Wabash

new invention brings added speed, accuracy and safety to 6" jointers



For Atlas, Duro, Delta, Walker-Turner, Sears and Ward's 6" Jointer

DURO'S new safety hold-down & pressure guard

Duro introduces completely new Jointer accessories which greatly reduce personal injury hazard — and make operation faster, easier and more accurate. "Hold-down" has rubber covered rollers which guide the stock, so hands are kept away from cutter head. Automatically maintains continuous, even pressure and guides stock toward fence — so that even warped or twisted lumber is planed perfectly flat and smooth. Swings out of way instantly when not needed. "Pressure Guard" provides side pressure at table level when edge jointing stock. This insures a true edge.

FIG. 1. — Note how easily "Hold-down" can be swung out of position.

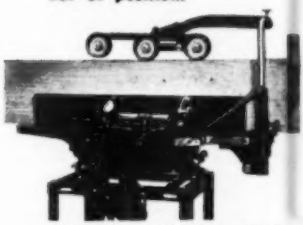


Fig. 2. — showing 8½" vertical capacity of Hold-down.

Send for Circular

Write for special circular giving prices, specifications and full details.

DURO METAL PRODUCTS CO.

Makers of Nationally Advertised Duro-Chrome Hand Tools

DURO Nationally Advertised POWER TOOLS

DURO METAL PRODUCTS CO.
2686 N. Kildare Ave.
Chicago 39, Illinois

Gentlemen:

Please send me full details on the new Duro "Hold-Down" and "Pressure Guard"—also catalog showing complete line of DURO Tools.

Name .....

Address .....

City..... Zone..... State.....

Drexel Furniture Company, Drexel, N. C., attach their bed rail slat bearers with glue and Auto-Nailer.

SLAT BEARERS *attached* with NEW SPEED at LOWER COST.

GLUE and AUTO-NAILER* DO A PERFECT JOB..FASTER.

The Auto-Nailer is unequaled for attaching tight-jointed bed rail slat bearers . . . eliminates boring and screwing or glue clamps. AUTO-NAILER'S 1,000-POUND-SQUEEZE GLUE-NAILING LETS YOU CONTINUE PRODUCTION WHILE THE GLUE SETS.

Auto-Nailer makes, drives and countersinks 3-NAILS-A-SECOND. It is also great for such glue-nail jobs as banding tops and attaching cleats to panels . . . invisibly.

Let us show you what Auto-Nailer will do.

LIKE TO SEE SOME SAMPLES? Send us specimens of your work. We'll be happy to demonstrate Auto-Nailer's virtue and versatility, no obligation.

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269 MARIETTA ST., N. W. • ATLANTA GEORGIA

Williams Furniture Co., Sumter.

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LET US

Keep America Green

Have you ever witnessed a big forest fire, wind-blown, sweeping through a growth of pine or cedar? If ever there was an awe-inspiring, devastating sight, such a one has no equal. When you figure the many, many decades of time it has taken these trees to come to their maturity and full usefulness and then see them burned and charred in a matter of minutes, it is really a shocking expense.

Even during drought periods such as we have been having in various parts of the country, such fires are in most cases preventable. It is a generally accepted fact that fall fires are set by city folks who come to the country for hunting, fishing, picnicking or touring while spring fires are set by the farmers and ranchers to burn out "varments and vermin."

Are you one of those in the former class who comes to enjoy the fall beauty and sport to be found in the woods and forests and then through carelessness or ignorance starts a fire that will burn innumerable trees and destroy the homes of thousands of birds and animals? Put out those camp fires, snub out those cigarettes and blow out that match before you toss it out of a car window into the dry grass along the roadside.

Many states have their "Keep This State Green" programs. Among the ways you can help your state is for you and your family to be careful and ask your friends to be careful, too. When you are at any meeting at home or in business, bring up the matter of forest fire prevention—it's your bread and butter and mine—we make our living out of one of God's most generous gifts, "TREES."

Don't read this and then forget it, this fall, more than any fall in many years, the hazard of terrible losses from forest fires is imminent—the drought and growing carelessness are responsible. Let us each one, personally, join the crusade to "KEEP AMERICA GREEN."

NED BAILEY
Editor in Chief

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EASY—Press trigger. Air does the rest.
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LIGHT— 2 pounds. Ideal for women workers.
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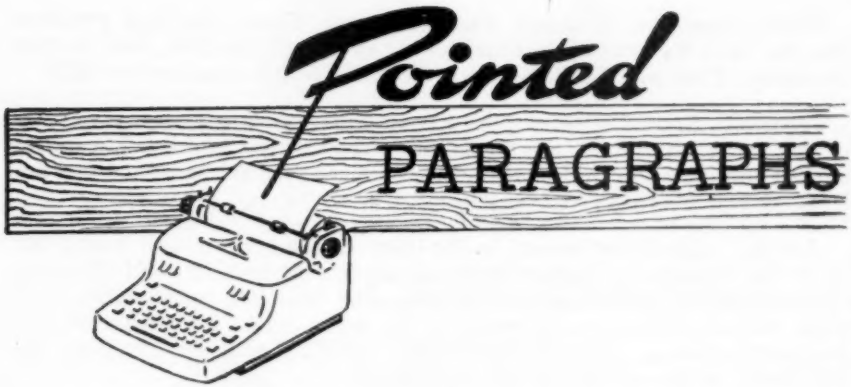


In his article in the recent *Saturday Evening Post* about "America's Strangest Lumberyard," Joe Alex Morris made the amazing discovery that "we still can't get along without wood. We use persimmon wood for making golf club heads; granadilla for clarinets, and the best policemen's billies are made of Dutch Guiana locust." Joe should read WOOD WORKING DIGEST, where he'd really learn about some of our American woods and how they are used.

At the time that this is being written, the first boat load of logs is on its way to this country from Tournata, Liberia. We have all been greatly concerned about the white oak blight in this country. Therefore it is with considerable interest that we hear of the big healthy white oak trees that grow in abundance in the part of Liberia where the LeTourneau Foundation is located.

We have heard that work with the Unicel trailer and freight car has led researchers to develop still another product. It is a portable type of dwelling known as "Unishelter." Primarily designed for defense projects, this three-unit, five-room house can be picked up, set on foundations and ready for occupancy in a matter of two hours. The structure is made entirely of plywood.

November is slated as the month when west coast plywood manufacturers begin their campaign to send 1952 retail plywood sales to an all-time high. The brain child of W. E. Difford, new managing director of the industry's trade association, the promotion will dramatize plywood as "today's best buy" for fall building jobs like remodeling, boats, farm buildings and Christmas shop projects.

New furniture style trends will tend more toward the use of "textured" hardwoods and warmer, more natural finishes. "Textured" hardwoods can be defined as those featuring natural irregularities such as sound twig knots, highlighted figures, whorls, swirls and color variations.

Word from the National Association of Home Builders predicts that by 1970 we will have reached an eventual 2,000,000 new homes annually. This will be 35% more than the figure reached in 1950.

Private U. S. and Israel capital joined with cooperative Israel capital in the establishment of the $800,000 Taal Plywood factory. The plant is on a ten-acre site and is equipped with modern machinery from the U. S., Czechoslovakia and Switzerland.

Another significant event is the new hardwood exhibit being set up at the Museum of Science and Industry on the south side of Chicago. Sponsored by the hardwood industry, the $350,000 presentation will rival the fine displays assembled by other basic industries at this popular museum. WOOD WORKING DIGEST will be carrying the full story of the exhibit in an early issue.

The recent National Hardwood Lumber Association meeting was a rather cheerful affair, principally, we presume, because hardwood lumber prices are on the upswing. The current increased demand indicates that '53 business will be much better than '52.

That we are engaged in one of the most aggressive and progressive of industries is more evident every year. There was a time, a decade or so ago, when the saying was, "It was good enough for grandad to use so it's good enough for me."

Today, according to DPA, "expansion in the lumber and wood products industry is imminent. With some accelerated amortization certificates as a booster, a goal of $50 million growth in facilities by the end of 1954 is well within sight."

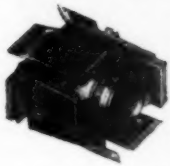
Jobs are solid guaranty of consumer market. Jobs will be easy to get, even by boom standards, till Christmas. In addition, workers will be drawing wages at the higher hourly rates now being established. That, too, underwrites purchasing power.

Washington is jubilant about fourth quarter. Industrial production, depressed to 192 in July by the steel strike, is expected to reach 220 to 223 by December. Employment will be 300,000 to 500,000 greater this year end than last. Wages are expected to be up an average of about 2 cents an hour by December 31. Average weekly hours will be higher this December than last.

Buying power is churning on big scale. Shift in incomes is spreading all across the U.S., which means businessmen will revise market planes. New York is still the wealthiest. California has jumped from fourth place to second. Texas has passed Michigan.

Special Cutter Problems— CALL DIEHL!

Standard Cutter Designs— ORDER FROM DIEHL!



For quick, low-cost *engineered* service on cutterheads and knives, call for a Diehl expert. With unmatched designing and machining facilities—backed by more than 40 years of practical experience—Diehl has a reputation for solving those cutter problems considered next to impossible.

Diehl also makes and stocks the finest, most complete line of standard heads and knives—"dynetrically" balanced for peak production at extreme spindle speeds.

No matter how complex your cutter problems appear, phone, write or wire your nearest Diehl representative or the G. M. Diehl Machine Works, Inc., Wabash, Indiana. And be sure to ask for the new Diehl Condensed Catalog on Cutterheads—Bulletin No. 452.

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Manufacturers of a wide variety of industrial products have found Weyerhaeuser a dependable supplier of economical wood parts.

The Robbins Incubator Company of Denver, a leader in the field of commercial incubators, uses wood parts fabricated by Weyerhaeuser to meet Robbins' high standards of construction.

To help speed the manufacture of trays and racks for Robbins Incubators, nearly thirty different wood parts are fabricated by Weyerhaeuser in various shapes and sizes to exact specifications. The Robbins Company receives wood parts of the right texture, cut from Western Pines which are light in weight and which work well in their nailing and gluing operations.

Weyerhaeuser's fabricating facilities permit economical mass production of partially or completely fabricated wood parts. This fabrication results in greater efficiency of operation for users of wood parts—as well as higher product uniformity.

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CHANGES IN OUR LUMBER MARKET . . .

by Raymond J. Hoyle

Head
Department of
Forest Utilization
State University of New York
College of Forestry

EVERY day sees a decline in the amount of our remaining virgin timber. This is not alarming because we know an increasing amount of young timber is reaching commercial size. Less timber is being destroyed by fire, forest land is being cut and managed more and more with a view toward future crops of trees, and up until July of this summer over 26 million acres on 3,745 certified tree farms have been given over to the production of continuous crops of trees in this nation. Everywhere we look in this country we find that good progress is being made toward assuring a future supply of timber.

Not only is timber growing, but we are learning to utilize our timber more efficiently. The amount of waste that is left in the woods is much less than formerly. Smaller, defective and formerly unwanted species are now often taken along with the better quality. If three trees today will give us as much material as four trees a few years ago, because of efficient use, we will be able not only to reduce costs but give the young trees more time to grow into larger sizes which are generally more profitable.

Production of many forms of forest products has been on the increase in recent years—but has this production kept pace with population changes and industry development and expansion? The plywood industry is expanding rapidly with new developments in this field. Softwood plywood production in 1951 was 2,995,000,000 square feet, or an increase of 12 percent over 1950. The production of lumber has been increasing since the war and reached a high of 38 billion feet in 1950.

What has been happening to our population and what is its relation to the timber situation? Some years ago a book was written which predicted our population would become stabilized in about the year 1950. In the light of the years which have come to pass, we know now that this prediction, like so many others, was grossly in error. So many unpredictable things can occur in a relatively short time that it is very difficult, if not impossible, to foresee what developments may transpire. The Population Reference Bureau, a private organization, has issued some new figures this summer that are revealing. The population of the U.S. increased more than twice as fast in the five years, 1946/1950, as it did between 1936/1940. The number of births has been increasing and the people are living longer. In the 1936/1940 period the U.S. had 17.3 births per thousand population and 11 deaths, or a net increase of 6.3 persons per thousand. In the 1946/1950 period the births were 24.1 and deaths 9.9. The births had increased and the deaths had decreased. In 1951 the baby crop broke all records and the same is true of the net population gain.

Our population is definitely on the increase and school boards and colleges are aware of the impact that it will make on educational facilities, and the school building program is booming. Agricultural interests are also talking about the impact this population increase will make on our food supply a few years hence. There may be an impact also on the wood supply, but how great will it be? Homes, furniture, toys, television cabinets, and hundreds of items made from wood will continue to be in large demand unless our precarious economic bubble bursts. That is another story about which the economists do not even agree. An all-out war also could upset our peacetime uses of wood, but we certainly would have a large wartime demand for this raw material which nature grows and regrows on soil and topography which is generally of little use for other purposes.

There are about 30,000,000 homes in this country, and approximately 25,000,000 are of wood. This high percentage of wooden homes is due to the many advantages of wood over other materials. In the seven years since the end of World War II a pent-up demand for homes has been released. This demand plus 12,000,000 marriages and 21,000,000 babies has been met with 6,400,000 housing units. This figure equals the number of units built in the previous 18 years. Although there is talk of over-building in some areas, the rolling tide of population is a factor that cannot be ignored. Homes and public buildings require furniture, fixtures, and many items that are made of wood. The future market for wood looks good, provided the lumber and woodworking industry becomes more research- and promotion-minded.

Some markets for wood have declined but others have expanded. Wood is yet the chief building material for homes, because of its many advantages, but we have seen large inroads made by brick, concrete, stone, steel, aluminum, fibre boards and composition shingles. The trend today toward one-story school buildings is a "natural" for wood, and it is a large market, too, in this enormous nation-wide school building program. Timber connector construction and glued laminated arches have continued to increase in application and acceptance in many larger types of buildings. These and other developments have recaptured and expanded markets for wood that were formerly enjoyed by other materials.

On the other hand, some markets for wood have declined. Wooden boxes have been on the decline for many years. The fibre carton (a converted form of wood) made tremendous inroads on the solid wooden box, and then the wire-bound and plywood containers have taken their place in the container field. The wooden containers declined, but new methods of handling require huge quantities of wooden pallets. The declining use of wood in motor vehicles and railroad cars are other outstanding examples where wood markets have been captured by other materials.

With a decline in amount of virgin timber being cut and in our effort to utilize raw material more closely, we have a problem of finding markets for an increasing amount of lower grades of lumber and new species as well as smaller trees with properties that are quite different from those of large timber. This young timber is giving us new problems to solve. We must learn the behavior of this new kind of wood, where is it the same and where different from the wood of older, larger trees we have been accustomed to using? Stock must now be more carefully selected for various uses than ever before. This younger timber must be properly sawed, seasoned, handled,

treated, selected and used. All of these things must be based on research and some of it may be slow and painstaking. We are working with a new raw material today and we must know more about it.

Detailed national figures are available for intervals during the past 40 years showing species and amounts of lumber used in the manufacture of furniture, millwork, fixtures, caskets, toys, boats, and 50 other classes of use. If one has a good memory and has been closely connected with some of these industrial markets for lumber, he may recall changes that have occurred over a period of years, but a close look at a few of these markets will show specifically what has been happening. Figures are available for 1928 and 1948. These were not depression years or war years. They could be called good business years. In this brief span of 20 years some markets have remained about the same in amount of wood used while others have increased or decreased.

Some Wood Using Industries That Have Shown An Increase In Amount Of Wood Used (1928 - 1948) (M feet)

Class of Industry	1928	1948
Furniture	1,153,000	2,139,000
Wooden-ware & novelties	141,000	203,000
Handles	124,000	241,000
Fixtures	122,000	256,000
Shuttles, spools & bobbins	53,000	106,000
Boot & shoe findings	49,000	78,000
Pencils & penholders	40,000	69,000
Toys	39,000	56,000
Laundry appliances	39,000	63,000
Sporting & athletic goods	30,000	83,000
Trunks & va'ises	21,000	36,000
Plumber's woodwork	16,000	33,000
Professional & scientific instruments	14,000	25,000
	1,841,000	3,388,000
		1,841,000
Increase in amount of lumber used by 13 classes of industries		1,547,000

Some Wood Using Industries That Have Shown A Decline In Amount Of Wood Used (1928 - 1948) (M feet)

Class of Industry	1928	1948
Sash, doors, & millwork	3,301,000	2,233,000
Car construction & repair	1,008,000	463,000
Motor vehicles	877,000	134,000
Agricultural implements	144,000	68,000
Ship & boat building	122,000	99,000
Matches	116,000	44,000
Musical instruments	102,000	58,000
Non-motor vehicles	81,000	22,000
Dairy, poultry & apiary supplies	41,000	12,000
	5,792,000	3,133,000
	3,133,000	
Decrease in amount of lumber used by 9 classes of industries	2,659,000	

In 1948 new and expanding uses of wood had developed to such an extent that new markets were now recorded whereas in 1928 they were too small to classify. Some of these new markets were:

Class of Industry	1948 (M feet)
Pallets	222,000
Prefab. homes and panels	176,000
Radio, television & phono. cabinets	161,000
House trailers	48,000
Venetian blinds	37,000
Laminated structural members	24,000
Prefab. structures (except houses)	19,000
	687,000

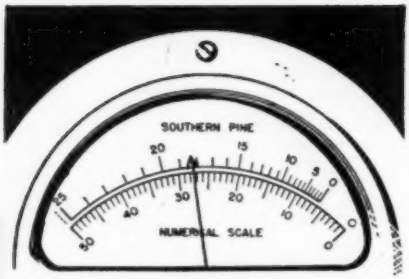
During the same period between 1928 and 1948 some hardwood species showed increases in these industrial uses as follows:

Species	1928 (M. feet)	1948 (M. feet)
Beech	148,000	196,000
Tupelo	256,000	310,000
Cherry	7,000	29,000

Those hardwoods showing marked decline are as follows:

Species	1928 (M. feet)	1948 (M. feet)
Birch	525,000	340,000
Hickory	146,000	77,000
Chestnut	195,000	22,000
Basswood	183,000	129,000

These new markets have developed because of new modes of living and new methods of handling or building, but behind these new ideas was the



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essential research and/or promotion that made them possible.

Why is it that some of the above species were used in greater amounts and some in less amounts by the woodworking factories of the nation? It requires courage to make guesses on some of these things, but my guess is as follows: Beech and tupelo increased because we have come to learn how to overcome some objectionable features which they have, especially the checking of beech and the warping and twisting of tupelo. Cherry has increased because of a recent popular demand (it is a style wood at present). Chestnut has declined greatly because of lack of supply. Birch, hickory and basswood are not relatively abundant and other woods can be used in their place.

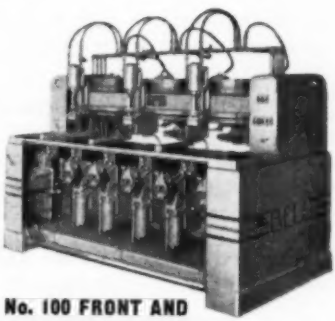
Let us pause a moment now and survey some of the previous facts. A rapidly increasing population, a greater interest and activity in growing timber, a better utilization of our timber, an increasing use of lumber and plywood, the demand for wood in some specific markets has been declining while in others it has been increasing, and new markets have also developed.

These facts are of interest to foresters and timberland owners who are trying to make tree growing a profitable business. They are of interest to sawmill men who need the construction and industrial markets for their products. The woodworking plants, too, are anxious to know if wooden products will continue to hold their former place.

Being interested in developments and being informed about trends is not enough. Action is what is necessary. The sort of action that has put all manufacturing industries over the top is based on research and promotion. The lumber and woodworking industry can be proud of some of the progress made through research and promotion,

You can Bore, Notch and Trim this leg in 3 seconds with a BELL 100

1200 legs an hour! . . . All holes drilled in **perfect** alignment—all notched **exactly** alike—ends trimmed with **precision!** Figure how your costs could nose-dive with production like **that!** The 100 handles front and back posts, table leaves, many other jobs. Set-up average 18-22 minutes. Let us give you the whole picture.



No. 100 FRONT AND BACK POST BORER

BELL WOODWORKING MACHINERY

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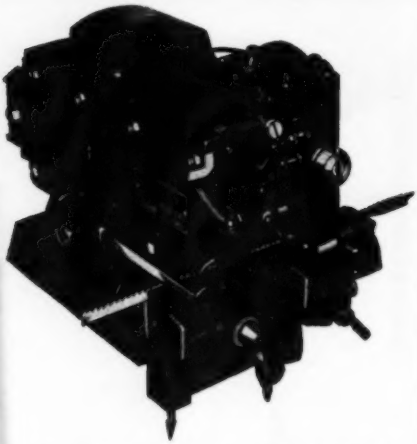

FILES, SETS, JOINTS Without Removing Saw From Sharpener

This improved saw sharpening machine has features that are found nowhere else. When the band saw is clamped into position, every operation is completed without removing saw from clamp. It files, sets and joints doing the work of 4 men sharpening by hand.

A big reduction in saw purchases is noted after the K5 goes to work. Saw breakage and saw cracks are stopped. The saws cut fast, smooth and straight and last longer.

THE WARDWELL MFG. CO.
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WARDWELL

but in comparison with most industries it is well toward the bottom of the list in these activities. If it were not for the fact that wood has so many excellent advantages in such a wide variety of uses, it would hold a less prominent place in our lives than it does today. If it had not been for an upsurge in population and a pent-up demand during the last war that has been released to a hungry market, much of the demand for wood would not have been present in the past seven years.

In many classes of wood-using industries the amount of wood used has increased, but in many of these industries other materials have been showing a much greater increase, so actually wood has not been getting its former percentage of the business. In the industries where wood has shown marked declines it is generally due to competitive materials. We can name a few places where wood has recaptured some lost markets like one-story schoolhouses or wooden arched and trussed roof structures. We can mention new markets like pallets and television cabinets, but all these do not anywhere nearly offset the many losses wood has sustained to steel cabinets, aluminum windows and siding, steel railroad cars, steel furniture, metal boats, substitute sheathing, plastic items and parts and all the other items that are no longer made of wood. Every lumber sales manager can recall ten lumber markets that have been lost entirely or have declined greatly to one new or expanding market that has been captured.

Is there a shortage of timber, or only a shortage of certain qualities or species? There are different opinions on some of these matters among the experts, but we do know that the large virgin forests are definitely becoming scarce and more and more we are getting into the timber growing business and we are using smaller sizes.

This young timber is bringing new problems to the millman and the remanufacturer. There is a need for the foresters, the mill men, the woodworking plants and the research men to understand each other's problems and to have a thorough understanding of the whole problem. Young growth timber for certain purposes is preferred to larger old timber but the people buying the timber and logs often do not know this. If representatives of these four groups just mentioned could get together and discuss their common problems which dovetail, each would profit from the other's knowledge and experience. Group meetings, even of a small nature, with these different interests present, would eventually bear fruit. With a clearer understanding of the problem of growing, milling, remanufacturing and selling the problems of research and promotion, which are the spark and gasoline to the motor, would be approached with greater understanding, sympathy and support.

What do we know about wood, what progress have we made, what is being done in research, and what does the future hold? In the beginning man reached for a wooden club to tame his mate or subdue his enemies. Let us skip over the wooden ark, caskets in the Egyptian tombs, and the wooden ships that brought explorers to our shores. Let us move along to 150 years ago and note that the majority of products made and used by man were yet totally or partly of wood. We do not have to go back very far in history to recall wooden utensils in the kitchen, wooden shoes, weapons, vehicles, fireplace chimneys, rakes, plows, hinges, locks, and a variety of hardware, clocks, submarines, battleships, car rails, buckets, fan blades, water wheels, cog wheels, luggage, carpenters' tools, machinery, and hundreds of other items made of wood.

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Planer—Moulder
Veneer—Clipper
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Over 66 years of concentrating on improving the design, steel alloy, hardening, manufacturing and inspection has resulted in DETROIT knives which are preferred by leading mills and manufacturers throughout the U.S.A. Try them - you'll save time and money.

Better knives since 1885

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DETROIT 34, MICHIGAN

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Up to 40 or 50 years ago practically nothing had been done in wood research in this country. Wood was abundant and at hand and our per capita use of lumber was at an all-time high. Wood was taken for granted and our appreciation of it was numbed. We have used it so long that we still take it for granted and when anything goes wrong in its use it is too often made to serve as the whipping boy. We do not appreciate the many advantages of wood. They have been listed so many times I will not repeat them here, but it is a material about which growers, fabricators and users may well become enthusiastic.

The tide of technical development in the material industries has been outrunning that of the wood industry in recent years and wood has been losing out in many markets. One of the few bright spots in the wood industry is the technical development in the pulp and paper industry, but the rest of our wood industry has not followed this pace. Careful calculations have shown the investment in research by the forest products industries and all other agencies interested in forest products is far less in proportion to the value of products manufactured than is made by practically any other industry, competitive and otherwise.

The steel, chemical and light metal industries are each reported to invest three times as much as the wood industry in research. Since the forest products research is often by small, inefficient, ill-equipped companies, the effectiveness of much of the wood research cannot be compared to the other industries.

The end product determines what comes out of the woods. This fact shows why foresters are interested in woodworking plants and their research and promotion work and also why

woodworking plants are interested in what is available in the woods. The growing of timber and the use of it are not represented by two parallel lines but rather by two halves of a sphere. These two fields of activity cannot successfully go their ways independently for they comprise one complete unit.

Wood has become a recognized, standardized engineering material with accurate knowledge of its properties and behavior characteristics. Not many years ago we gave little or no thought to preservation treatment, kiln drying, the moisture resistant types of glues, the heart and sap wood, the rate of growth, and all the other developments that the recent pace of our economy has forced us to consider. If we are to continue meeting the pace of competition it will be necessary to constantly improve upon our knowledge in reducing costs and increasing quality and service of products made of wood.

Wood has not reached the limit of its usefulness. It is on the threshold of a great expansion that can be made possible by research and promotion. Wood should be reaching out for every possible old and new market. Every conceivable use should be studied and matched with the properties of wood. When all the properties of wood in all the species in the various forms and modified forms are understood and appreciated, wood will recapture more declining markets and find new ones.

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American WOODS

By reader request we are continuing the listing of American woods which we began in our Directory Issue (October). Next month will see us back to our regular monthly feature—selecting and describing one particular wood.

BLACK OAK

Leaves More Varied Than Those of Other Oaks

Quercus velutina, La Marck

Habitat—Its range extends from southern Maine to southeastern Minnesota, thence south to northern Florida, west to eastern Texas, Oklahoma and Kansas, southeast to Nebraska and Iowa. It is the most numerous species in cut-over forest areas in upland locations, growing on the poorer soils of slopes and ridges. Here young trees develop long tap roots which enable them to survive where many species would not for lack of water.

Growth and Appearance—Black oak no doubt gets its name, and without too much justification, from the fact that the bark on the mature tree is dark gray, almost black inland and paler in coastal regions. On young trunks bark is warm gray and smooth. The inner bark is deep orange, very bitter to taste and rich in tannin. From this inner bark a yellow dye is made—quercitron.

Availability and Use—The heartwood of black oak is reddish-brown and the sapwood narrow and pale. The wood is heavy, hard, strong but not tough or coarse-grained. It checks during drying and has fewer medullary rays than the wood of other oaks. It accounts for about 15% of the oak stand in the U. S. Although it is not easily worked, it is used for cheap furniture, slack cooperage, flooring, interior trim and construction materials.

BOXELDER

Lightest of the American Maples

Acer negundo, Linnaeus

Habitat—A rapid growing tree, it is found from New England to Florida, across the eastern states and in Canada to Alberta and the eastern slopes of the Rocky Mountains.

Growth and Appearance—There does not seem to be the systematic growth to boxelder that is usually found in other species. Irregularly shaped, with limbs that grow in every direction, it is found bordering lakes and streams as well as the drier soils of the prairie states.

Availability and Use—Until the beginning of the twentieth century, boxelder was widely planted for street and windbreak purposes. It is no longer used in this way because of its short life and frequently fatal injury by wind and sleet. It is also susceptible to defoliating and boring insects as well as heart rot.

When air dry the soft, close-grained creamy white wood weighs about 26 lbs. per cubic foot, making it the lightest of the American maples. The wood, like that of the soft maple, is sold for crates, boxes, slack barrels, handles, paper pulp, charcoal, cheap furniture, wooden-ware and fuel. Maple syrup and sugar of a low grade is obtained from the sap.

There is research being done on the boxelder and similar soft, quick growing, short-lived species to find out if by chemical or other treatment such a prolific species cannot be put to more commercial uses.

BUR OAK

The State Tree of Illinois

Quercus macrocarpa, MICHAUX

Habitat—Sometimes known as the mossy cup oak, bur oak is found from Manitoba to Nova Scotia, south through Pennsylvania and westward into Kansas and Texas.

Growth and Appearance—This tree gets its name from the unique fruit—a broad, smooth nut, often 2" long that is not quite enclosed by a rough, moss-like "bur" or cup. The scientific name for the tree follows the same pattern: "macrocarpa," meaning large fruited, refers to the large nut whose sweet, white kernel is edible. "Quercus" is the Latin word for all oaks and is made up of a Celtic world "quer" or fine and "cus" meaning tree. Combining the scientific name we have a good description of the bur oak—"a fine tree with large fruit."

Although the average height is about 80 feet, it often grows to 170 feet and trunk diameters vary between 3 to 7 feet. Under very unfavorable conditions it takes the form of a bush six to eight feet high.

Availability and Use—The light brown, close-grained, hard tough heartwood has conspicuous medullary rays and resembles white oak so closely that it is often classed with that species on the market. Bur oak is used for furniture, interior trim, moldings, vehicle parts and veneers. It is also used in shipbuilding and for railroad ties and structural materials.

CALIFORNIA INCENSECEDAR

Source For Moth-proof Wardrobe Linings

Libocedrus decurrens, TORREY

Habitat—Incensecedar is confined largely to elevations of 4000 to 8000 feet and ranges about 1000 miles from the Santiam River in Oregon south along the Cascade Mountains and Sierra Nevadas and California coast ranges to the mountains of southern and Lower California.

Growth and Appearance—When fully grown, the tall, compact, columnar-crowned, cinnamon red trunked tree reaches a height of from 75 to 150 feet and trunk diameters up to 5 feet. The yellow flowers blossom in midwinter, making the tree look like gigantic golden rod. The down-sweeping branches provide shelter for man and animal. Occasionally this beautiful tree lives to be 1000 years old. Incensecedar has been extensively planted for ornamental purposes in the eastern states where it does very well as far north as Massachusetts.

Availability and Use—The red tinged, soft, light brown wood is surrounded by creamy colored sapwood. Compact, fine, straight-grained, it splits readily and evenly, does not check or warp in seasoning. It is aromatic and takes a good polish. The seasoned wood is extremely durable. The wood is used for fence posts, railroad ties, shingles, lathes, pencil slats, cedar chests, interiors of wardrobes and closets, door and window frames, cigar boxes and furniture.

EASTERN COTTONWOOD

A Thirsty, Rapid Growing Tree

Populus deltoides, BARTRAM

Habitat—The Eastern cottonwood grows from Quebec to northern Florida, west along the streams leading to the Great Plains with very large groves in the north and west. Usually about 100 feet high with about 4 foot diameters, it grows under most favorable conditions to 150 feet in height.

Growth and Appearance—Frequently

Saddles or scoops any shape or size of chair seat.

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planted for shelter and ornament in the treeless plains and prairies west of the Mississippi, the widespread, shallow root system often upheaves sidewalks. Moreover, the tiny rootlets fill drain pipes in their search for water. Accordingly, many towns and cities prohibit the planting of cottonwood within their boundaries. Cottonwood is remarkable for its rapid growth—young trees have been observed to grow five feet in a year. This tree bears flowers of different sexes on different trees. It reproduces from stumps, root sprouts, seeds and cuttings.

Availability and Use—The wood is of varied shades of brown with a thick white margin of sapwood. The wood which warps easily when seasoning is close-grained, porous, soft, weak and easy to work. It is almost tasteless and odor free. It is used commercially for veneer cores, boxes, crates, packing cases, excelsior, paper pulp, poles, posts and fuel.

GINKGO

The Living Fossil

(*Ginkgo biloba* LINNAEUS)

Habitat—This tree has been called a living fossil for it seems to be identical with fossil species which have been described, and presumably was a common tree in the present temperate and circumpolar regions of the whole northern hemisphere. It is found throughout the United States with the exception of the northern plains states.

Growth and Appearance—The fan-shaped leaf is found in no other flowering plant and resembles the leaflet of the maidenhair fern. The manner of fertilization of the female flower is similar to what takes place in the ferns and botanists have called it a missing link between flowering plants and ferns. At maturity the ginkgo is a stately tree, 100 feet or more in height with a cylindrical, slightly tapering trunk sometimes as much as 8 feet in diameter.

Availability and Use—Ginkgo wood is white or yellowish white and there is no distinction between sapwood and heartwood. Light in weight, soft, weak, fine textured, it is easy to work, but the wood is of little value. In China and Japan it is used for chess boards and chess men. It is desirable for planting as an isolated specimen, in groups, or as a street tree.

PERSIMMON

A Plum-sized Fruit That Is Really a Berry

Diospyros virginiana, LINNAEUS

Habitat—This tree grows on a wide variety of soils and sites from Connecticut westward through southern Pennsylvania to southeastern Iowa, eastern Kansas and south throughout Texas and Florida.

Growth and Appearance—The persimmon is the most northern member of the ebony family, a tree of moderate size with crooked branches and a round-topped, cylindrical crown massed with glossy leaves. It is better known for the puckery quality of its immature fruit than it is for the ebony-hard quality of its wood. It is a problem in many areas where it grows as a large shrub to form extensive thickets on abandoned land. Commonly it attains heights of 50 feet and 12 inch trunks. Under ideal conditions it may reach 130 feet.

Availability and Use—The fruit, globular in shape, is a true berry about two inches in diameter and has from one to eight seeds imbedded in the flesh. At one time, in the early days of our country, the seeds were roasted for use as coffee. The big berries change from pale green to blackish purple when ripe. The pulp loses its high astringent tannin content and becomes sweet and delicious with food value second only to the date. Comparatively little sapwood turns to heartwood until trees are close to 100 years old. The wood is close-grained, hard, strong and tough. The sapwood is chosen for use as shuttle

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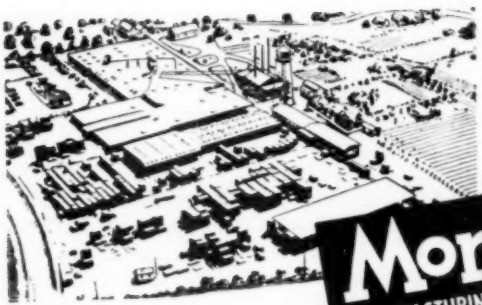

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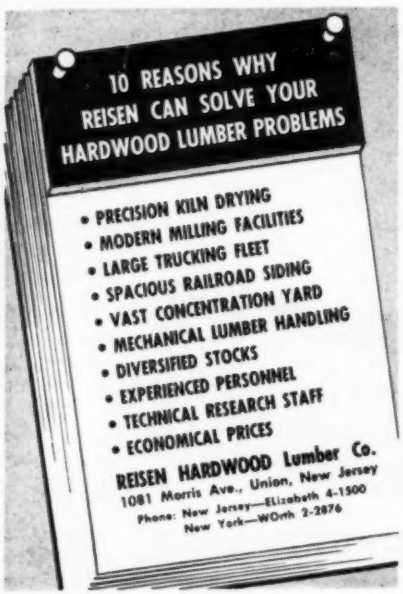
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PONDEROSA PINE

The Skyscraper

Pinus ponderosa, DOUGLAS

Habitat—From British Columbia and the Black Hills of the Dakotas, southward in both Pacific and Rocky Mountain regions, on to western Texas, New Mexico, Arizona and northern Mexico and Lower California the ponderosa pine grows.

Growth and Appearance—In different parts of its range there are noticeable variations in color and texture of bark and wood, length and thickness of the needles and the size of the cones. It grows on well drained uplands and mountain slopes to an elevation of 12,000 feet. In northern Arizona and New Mexico plateau areas ponderosa pine constitutes about 80% of the vast and valuable forests. Heights of 230 feet and trunk diameters of 8 feet are not uncommon. It is known to grow 500 years old. The scaly bark on the massive trunks is cinnamon brown to orange-yellow. The bark during the first 100 years is dark brown to black, accounting for the name blackjack pine which is sometimes applied. Ponderosa pine has five to ten inch needles which normally remain on the twigs from three to seven years.

Availability and Use—The estimated merchantable stand, including Jeffrey pine, is about 180,000,000,000 board feet and is exceeded only by Douglas fir and southern pine. The amount of lumber cut ranks fourth among that cut annually in the U.S. The seeds of the tree have a strong resinous flavor and are inedible.

The wood is used for plywood, general construction, interior finish, boxing and crating. Unfortunately the tree is subject to attack from fungi and many insects.

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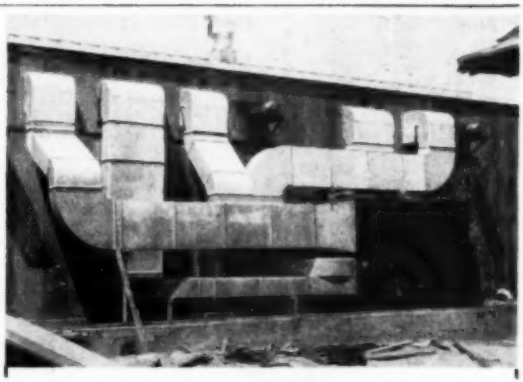

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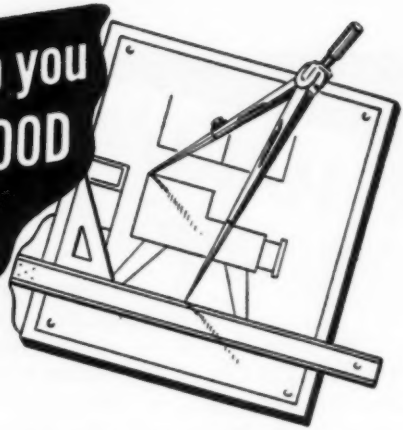

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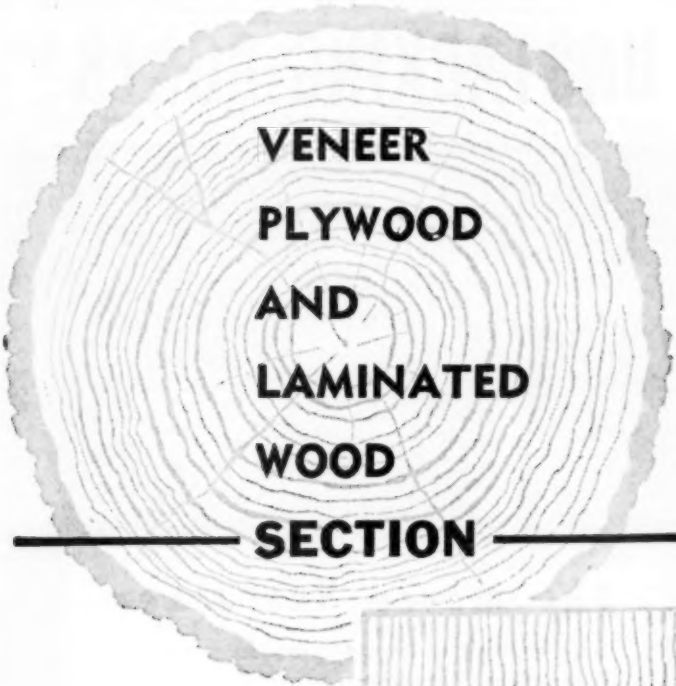

VENEER PLYWOOD AND LAMINATED WOOD SECTION

Features . . . .

Types of Plywood

By Thomas Perry

Electronic Gluing
Part 2—Edge Gluing

By Paul H. Graham

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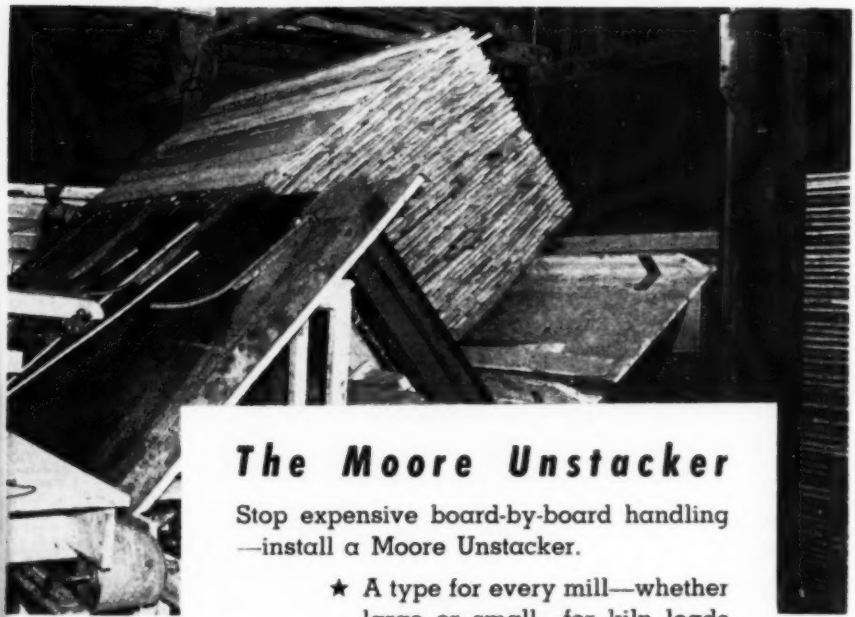

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TYPES OF PLYWOOD

Part 12

RESIN IMPREGNATED PLYWOOD

By Thomas D. Perry

THERE has always been a moderate amount of penetration by a plywood glue into the wood adjacent to the glue joint. There had to be in order to produce a strong joint. However, with the older glues and before hot pressing, such penetration was not considered a phase of impregnation, and its effects in that direction were not thought to be significant.

With the advent of synthetic resin adhesives, in the late 1930's and early 1940's, this feature of adhesive impregnation began to assume importance. It was normal for the resin adhesives to penetrate deeper than the older wood glues, unless retarded by fillers or other controlling ingredients in the mixture. The thinner the veneer the greater the impregnating effect. Hot pressing added to this impregnating tendency. This was the beginning of a new technique, which has resulted in a denser and harder modified wood, considerably heavier than normal wood and far more resistant to wear and abrasion.

When this impregnation was combined with super pressures and heat, both of which would tend to substantially compress the wood, the result was another type of improved wood product. A soft, low density species like yellow poplar, when impregnated with resins and compressed, would exhibit some of the qualities of a high density species like sugar maple. This afforded opportunities to use common and relatively low cost species, and to process them so that they would have most of the physical characteristics of rare and costly woods, like dogwood or boxwood. These unusually dense woods seldom attain such a size as to produce long and wide boards. By this process, long and wide boards, of the desired ultimate density and specific gravity, could be produced in more generous sizes than are provided by nature. The cost might be as much, or even more, than the rare wood, but the product could be manufactured in a short time and in desired sizes, which usually outbalanced the higher costs.

Classifications of Improved Wood

In the early stages of this development, this impregnated and compressed wood was called "improved wood," but it soon appeared that the term was too broad and required subdivisions. Several processes were developed for converting normal veneers into several types of improved wood, varying in technique, and in cost, as well as in the investment required for equipment.

In order to clarify the problems involved, the following subdivisions were developed for the second edition of "Modern Plywood"* and the descriptions are substantially condensed here.

*"Modern Plywood," 2nd ed., 1948, pp. 260-280. Pitman Publishing Co., New York City. Used by permission of the publisher.

Table 1. Pick-up Ratios with a Phenolic Resin Film

Description	Thickness of Veneer								
	1/32"	1/36"	1/40"	1/45"	1/48"	1/54"	1/60"	1/64"	1/80"
BIRCH									
A. Resin content, net oz. per square foot	0.133	0.133	0.133	0.133	0.133	0.133	0.133	0.133	0.133
B. Weight of veneer, oz. per sq. ft., bone dry	1.64	1.46	1.31	1.16	1.09	.97	.87	.82	.66
C. Resin pick-up, percent. A/B x 100	8.1	9.1	10.2	11.5	12.2	13.7	15.3	16.2	20.1
YELLOW POPLAR									
A. Resin content, net oz. per square foot	0.133	0.133	0.133	0.133	0.133	0.133	0.133	0.133	0.133
B. Weight of veneer, oz. per sq. ft., bone dry	1.07	.95	.85	.76	.71	.63	.57	.53	.43
C. Resin pick-up, percent. A/B x 100	12.4	14.0	15.6	17.5	18.7	21.1	23.3	25.1	30.9

I. Impregnation by interleaving veneers with a phenolic resin film (Tego).
   Applicable to veneer thicknesses of 1/32" to 1/80".
   Ratios of resin pick-up, with birch, from 8% to 20%.

II. Impregnation by spreading liquid phenolic resin on the veneers.
   Applicable to veneer thicknesses of 1/16" to 1/30".
   Ratios of resin pick-up, with birch, from 11% to 25%.

III. Impregnation with phenolic resin by pressure-vacuum cycles.
   Applicable to veneer thickness of 1/8".
   Ratios of resin pick-up, with sugar maple, from 20% to 38%.

It should be assumed that this classification covers all types of impregnated plywood, but the three are typical and the principles employed underlie most impregnating techniques.

Resin Pick-up

The term, resin pick-up, may be defined as the percentage of weight added by the impregnant, after cure, compared with the weight of the untreated dry wood (100%) of which the assembly is made. Essentially it is the ratio of the weight of the resin solids compared with the weight of the wood fiber. Obviously, the weight of the paper carrier in the film, and all of the solvents used for spreading and soaking, must be allowed for in all calculations.

Low resin pick-up gives predominance to the tough fibrous strength of the wood, while high resin content imparts the hardness characteristics of the resin. Service requirement will usually control the degree of pick-up required for a given product.

Phenol-formaldehyde resins are widely used in these impregnation processes and impart a dark brown, almost chocolate, color to the finished product. The phenolics are waterproof and highly heat resistant at temperatures below those at which wood chars. It is probable that the use of a melamine-formaldehyde resin would avoid this dark color, but the writer has seen very few reports of such developments on a production scale.

I. Impregnation with a Resin Film

This process involves standard plywood constructions using Tego adhesive film, interleaved between sheets of veneer. The veneer thicknesses included in this type, 1/32" to 1/80", are particularly adapted to film gluing, since they are too thin to be run through the standard glue spreader. These veneers should have a moisture content of approximately 10%. Hot press platen temperatures are of the order of 300° F,

Table 2. Pick-up Ratios with a Phenolic Resin, Spreader Applied

Description	Thickness of Veneer							
	55% Solids				70% Solids			
	1/16"	1/20"	1/24"	1/30"	1/16"	1/20"	1/24"	1/30"
BIRCH								
Liquid resin per joint, pounds per 1,000 sq. ft.	40.	40.	40.	40.	40.	40.	40.	40.
Solid resin per joint at 55%, lbs. per 1,000 sq. ft.	22.	22.	22.	22.				
Solid resin per joint at 70%, lbs. per 1,000 sq. ft					28.	28.	28.	28.
Net solid resin per joint, ounces per square foot	.352	.352	.352	.352	.448	.448	.448	.448
Weight of veneer, oz. per sq. ft., bone dry	3.28	2.62	2.19	1.76	3.28	2.62	2.19	1.76
Resin pick-up, percent	10.7	13.4	16.1	20.0	13.7	17.1	20.4	25.5
YELLOW POPLAR								
First 4 tabular lines same as above								
Weight of veneer, oz. per sq. ft., bone dry	2.13	1.71	1.42	1.15	2.13	1.71	1.42	1.15
Resin pick-up, percent	16.5	20.6	24.8	30.6	21.0	26.2	31.5	38.9

with curing cycles depending on the thickness of the assembly, approximately 30 minutes for an ultimate thickness of one-half inch. Pressures, for maximum density, are in the vicinity of 2,500 lbs. p.s.i. The hot press platens should have alternate connections for circulating cold water, since many impregnated constructions require that the temperature of the platens be reduced to about 150° F before releasing the pressure. It will be noted, in production, that compression in the wood occurs gradually, as the heat penetrates the assembly, and that the compression of the central layers takes place near the end of the curing cycle. Practical considerations limit the total ultimate thickness of these assemblies to one inch. Many operators prefer to work in half-inch units of thickness.

The ratio of resin pick-up, when using birch or yellow poplar veneers, is indicated in Table 1. Similar calculations can be made for other species.

The ultimate specific gravity, under this process, is of the order of 1.25, which is approximately that of lignum vitae. The extent of compression that will occur in birch will be about one-third of the original thickness, leaving the final product about two-thirds as thick as the aggregate thickness of the original assembly. In yellow poplar the compression is about one-half.

It should be noted that the chief difference from normal plywood production is the use of a hot press capable of exerting 2,500 lbs. p.s.i., in which the platens have connections both for heating and cooling.

II. Impregnation by Spreading a Liquid Resin

Again this technique closely follows normal plywood production procedure, but requires the higher range of specific pressures, together with facilities for cooling the platens while the plywood remains under pressure. The spreading operation, on 1/16" to 1/30" veneers, is relatively simple and the usual solids ratio for most standard phenolic resin adhesives is approximately 70%. Better penetration may be obtained with a thinner mixture, containing about 55% solids, but special spreader adjustments will be required.

In either concentration the spreader rolls are adjusted to a 20 lb. liquid spread per single surface, or a 40 lb. total spread per joint. Double spreading

Table 3. Pick-up Ratios with a Phenolic Resin, Vacuum-Pressure Cycle Maple Veneers, 1/8" thick, 10% to 13% m.c.

Solids Concentration	End of Cycle	Resin Pick-up	
		Vacuum and Pressure	Pressure only
55%	1	32.0%	27.0%
	2	37.4%	30.6%
	3	.....	32.8%
40%	1	30.2%	19.8%
	2	33.7%	22.6%
	3	38.2%	.....

is required, on both sides of the veneer, except for the outer layers, which are run through the spreader in pairs. Since considerable moisture is carried into the veneer by the solvent of the adhesive, the veneer must be as dry as possible, some 5% m.c. It is of prime importance that this spread veneer be dried on racks, down to a range of 6% to 10% m.c. before hot pressing. Unless properly dried to this point, steam pockets may develop during hot pressing. Under most conditions, drying temperatures up to 140° F are permissible.

The attainable ratios of resin pick-up in this process are shown in Table 2, both for birch and yellow poplar. The conditions indicated in this table are believed to be optimum, but variations in the solids concentration of the mixtures, as well as in the spreading ratios, provide a wide range of possible resin pick-ups. Any of these can be computed by the method outlined in the table. While this process can be stretched to veneers thicker than 1/16", it has not been found satisfactory, since there may be a relatively unimpregnated area in the center of the thicker veneer, which may impair dimensional stability, under severe moisture exposure.

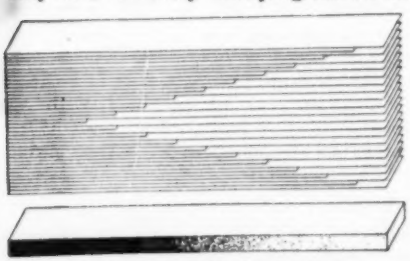

Figure 1. Variable density by layers.

The amount of compression, one-third for birch and one-half for yellow poplar, is in line with that found when using a film adhesive.

III. Impregnation by Vacuum-Pressure Cycles

This is quite a departure from normal plywood operations, and applies to assemblies of veneers that are usually 1/8" thick. One of the equipment requirements is a pressure cylinder, cross connected to a vacuum pump, as well as to a compressor capable of maintaining 50 lbs. p.s.i. and up. The veneers are immersed in a liquid phenolic resin mixture, and first subjected to 10 minutes of vacuum, at about 25" of mercury, followed by the release of the vacuum and the application of 50 lbs. p.s.i. pressure for 10 minutes. This is considered one vacuum-pressure cycle, and three cycles are usually sufficient for an adequate degree of impregnation of the resin into the cellular structure of the wood.

After the veneers have been saturated with resin, and before assembly for hot pressing, the solvent of the adhesive must be evaporated until the veneers reach a moisture content of between 4% and 9%. This solvent drying can be accomplished by exposure at room temperatures for several hours, and can be accelerated by kiln temperatures not above 140° F. However, maximum

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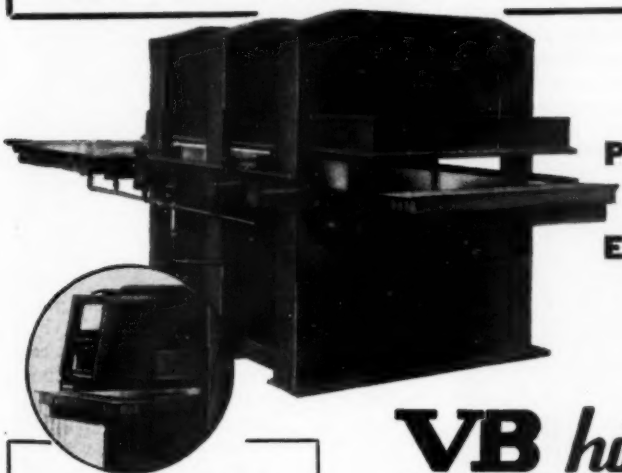

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strength in the final product is the result of drying at moderate temperatures, preferably under 110° F.

The hot pressing operation is similar to that employed for the two preceding types, except that non-conducting cauls must be used, since the outer surfaces of the assembly are impregnated.

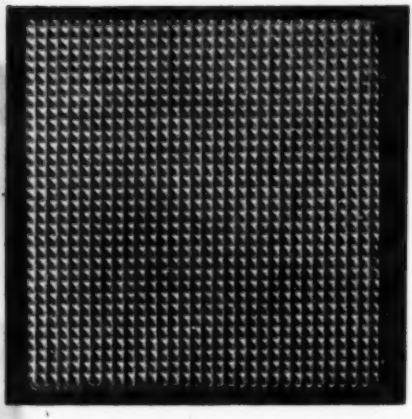

Figure 2. Localized high density areas.

There is no way to calculate, mathematically, the resin pick-up by this process, but the data in Table 3 suggest typical results. In setting up this procedure it is important to predetermine the best method of attaining the desired results.

It is possible to impregnate 1/8" maple veneers by soaking for 12 to 24 hours, or by pressure alone, but the results are less consistent than with the positive pressure-vacuum cycle method. When pressure alone is used, a cycle is 10 minutes under pressure, followed by no pressure for the same time interval.

Impregnated Veneers with Parallel Laminations

Impregnated, or high density plywood, the major objective of this article, is made according to standard plywood constructions, i.e., with alternate crossed layers. However, many of the applications of this high density plywood require relatively small areas, or long narrow strips, and it is seldom that large sheets are required. Hence there are many uses where impregnated assemblies with parallel laminations may be preferred. One example would be a picker stick for textile looms, some three feet long, not over one inch thick, and having a maximum width of three inches, an item which is subject to severe repetitive impact blows on its upper end. It is quite obvious that parallel laminations would be preferable to cross laminations. The only practical difference in manufacturing procedure is the direction in which the grain is laid up. In all other respects the techniques of impregnated plywood are applicable, and such laminated veneer products are customarily made in plywood factories, often in multiple sizes, to be ripped into narrow units after impregnation and cure.

Another modification in construction is to cross every fifth, tenth or twentieth layer, a process that finds some advocates.

Effect of Pressure

The specific pressures, so far mentioned, have been of the order of 2,500 lbs. p.s.i., accompanied by substantial compression of the wood. This high pressure product, regardless of the process by which it is made, has been called Compreg. In contrast, Impreg is a similar impregnated product in which the applied pressure is much lower, varying from 250 lbs. to 500 lbs. p.s.i., and accompanied by very little compression in the wood. Impreg has been found suitable for many applications, particularly in some of the variable density constructions described later. Impreg can also be made in standard hot presses, by limiting the area, in

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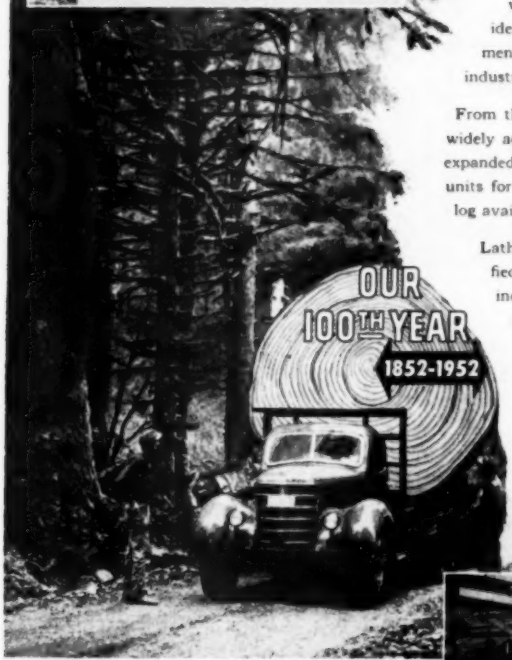

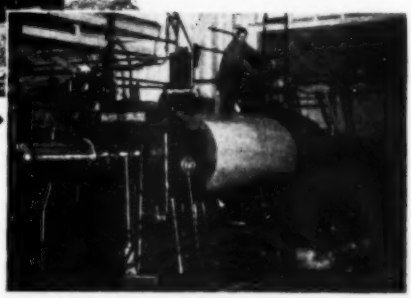

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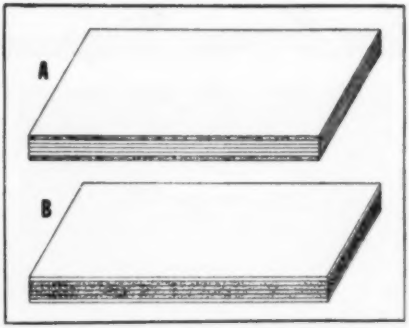

Figure 3. Embossed surface of high density plywood.

order to obtain 500 lbs. specific pressure.

While 2,500 lbs p.s.i., has been mentioned, it should be noted that increases in strength characteristics and in compression are quite gradual from 1,500 lbs. p.s.i., and up to 3,000 lbs p.s.i.

Variable Density

There are many instances where complete impregnation would sacrifice the resiliency of the wood, would make the ultimate product too heavy, or would add unjustifiable cost factors. There are a number of types of variable density, most of which fall into two general patterns, viz.:

Density Variations by Layers. This is accomplished by assembling resin impregnated veneer layers with normal unimpregnated layers, as is illustrated in Fig. 1. In the case of sketch A it was important to have a hard abrasive resistant surface, and still avoid the excessive weight involved when all layers are impregnated. The outer veneer layers can be impregnated by process II or III, as described, and a suitable adhesive used between the unimpregnated layers.

Sketch B illustrates a veneer assembly with impregnated inner veneer layers for maximum strength, and normal veneers for outer layers. An ex-

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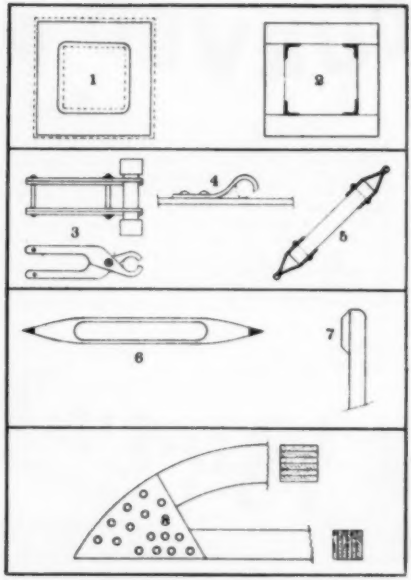

Figure 4. High density applications. 1-2, filter frames of maximum strength and durability; 3, dielectric pliers for changing high voltage fuses; 4-5, dielectric clips and links for guy wires on electric poles; 6, high density shuttle for looms, an alternate for dogwood; 7, upper end of a picker stick, before compression; 8, high density gusset plate for laminated timber arch.

ample might be where assembly gluing is involved, since gluing to an impregnated surface, while possible, is rather difficult, and a normal wood surface would be preferable.

In both A and B specific pressures should not exceed about 300 lbs. p.s.i., since higher pressures would tend to crush the unimpregnated layers.

Localized Areas of High Density. This involves adding extra layers of impregnated veneers of a limited size where the high density is required, and is illustrated in Fig. 2. Here the alternate layers are gradually shortened,

producing an assembly with an initial thickness of 1-1/2" at the left and a trifle over 1" at the right end. When compressed in a hot press, at approximately 2,500 lbs. p.s.i., against stopper bars 1" thick, the result will be as shown in the lower sketch. There will be maximum density at the left end, which is heavily shaded, and a strong glue bond with minimum density at the right. Such variable density blanks were widely used in England, during World War II, for small aircraft propellers, with maximum strength at the hub, and a minimum of centrifugal force at the tip. Another example would be a laminated picker stick, in which high density may be essential at both ends, with maximum resiliency required in the center.

Special Irregular Surfaces

This high density impregnating process lends itself to producing either smooth or irregular surfaces, since the layers are somewhat plasticized by the resin and the heat, and can be pressed against a reverse embossed plate, as suggested by Fig. 3. Such irregular surfaces are useful when clamping against wood members, where bolt pressure can develop interlocking surfaces of maximum shear strength, as exemplified by the gusset plate in the lower sketch of Fig. 4.

Many of the uses of high density plywood and laminated wood are in the military field, electronic and radar, where high strength and dielectric qualities are essential, but they are "hush-hush"! A few civilian applications are sketched in Fig. 4, and described in the captions.

Conclusions

Resin impregnated wood, in plywood or laminated constructions, is a highly specialized product, in the higher cost ranges, but there are many applications where it is well nigh indispensable.

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ELECTRONIC GLUING

A Survey of equipment applications

Part 2—Edge Gluing

By Paul H. Graham

THOSE manufacturers who do not manufacture electronic generating equipment but build special pieces of equipment which require electronic heaters advised generally that when electronic generators are properly selected, operated and controlled, as previously described, auxiliary equipment or pressing equipment or supporting C frames, etc. are incidental and can be changed from original design and still have creditable results. Many of these specially-built electronic gluing units used with electronic generators for curing glue lines now perform in a single operation involving just a few minute jobs which formerly required multiple operations and hours of curing time. Moisture content of the wood is seldom disturbed due to low adhesive to wood mass ratio and the fact that part of the water carrier used in resins is consumed in forming the polymer chain responsible for the bond, thereby leaving a negligible moisture residue. There is only slight increase in wood temperature in all but the through or perpendicular heating method.

When this magic heating process was first introduced, electronic gluing equipment suffered from a program of zealous over-selling which led users generally to believe wood constructions to be bonded by this equipment did not require the same careful preparation as was required by conventional bonding methods.

However, the opinion is also expressed that the success of initial electronic press installations was far short of theoretical values since the emphasis was on curing times rather than approaching the problem first from the standpoint of materials handling analysis and secondly, adjusting the size of the dielectric generator to suit. The current approach is primarily from the materials handling viewpoint and has resulted first in an early trend toward larger dielectric generators for a given size of electronic press and finally a leveling off in generator size based upon experience in optimum conditions of production, initial capital investment and operating costs.

This seems to have been particularly true in the promotion of edge gluing presses. Experience proved that twisted and distorted stock cannot be edge glued with any greater success in an electronic press than it is possible to achieve with conventional hand clamping machines, despite the fact that most electronic presses afford higher and more consistent application of joint pressure. Stresses set up by twisted stock inevitably cause a large number of rejects.

Manufacturers of this equipment soon replaced the high pressure type sales-

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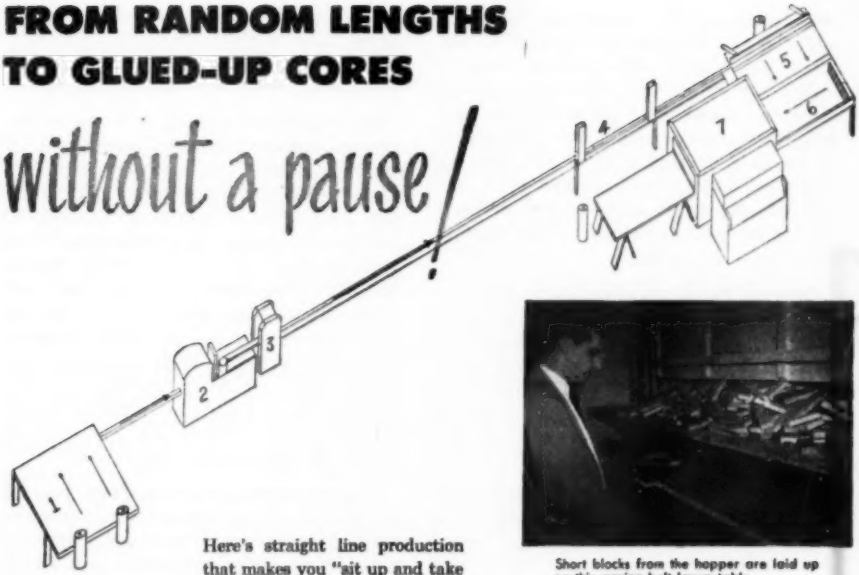

Short blocks from the hopper are laid up on this moving-belt layup table.

Glued blocks, now on edge, are automatically moved onto the transfer table.

Finished core is automatically pushed out of the Electrogluer.

Here's straight line production that makes you "sit up and take notice." Starting with random length boards laid up manually . . . automatically conveyed through the sticker for surfacing . . . through the glue spreader . . . on to assembly with edge-strips . . . conveyed to the infeed table and automatically pushed into the Electrogluer for fast, automatic electronic edge-gluing . . . and out comes the finished core or panels. Continuous operation . . . largely automatic . . . *requiring only two men and two girl operators.*

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man with service engineers. Instructional articles were contributed to the trade magazines and a general educational campaign was instituted, based upon the findings of the engineers and magazines. Lack of sufficient knowledge of adhesives and their application in this new gluing process led to a cooperative educational program by both adhesives and electronic gluing equipment manufacturers.

One of the most significant features of this program has been the positive approach used to bring out important factors. This is well illustrated by a statement made by Paul C. Yankauskas of Pico Machinery Corporation which appeared in a recent issue of the Cathode Press:

"Since radical changes in moisture content of the lumber and pockets of resin must be watched, because arcing and open glue lines will result, an electronic edge gluing machine may be considered not only an instrument of more efficient production but also an electro-mechanical inspector for controlling quality. With an electronic gluer, lumber that has more than 4% or 5% moisture differential to the panel itself will be rejected because the generator will refuse to glue it, the machine having been set for properly dried stock. Lumber of mixed species, mixed densities, low temperature, excessive thickness variations, and poor jointing will be revealed by unglued joints."

To combat early claims that glue joints bonded by electronic heating failed in service soon after bonding, exhaustive laboratory tests were made with wood samples bonded by electronic heating with curing cycles of 15 seconds to 2 minutes and by hot pressing in the conventional manner, using all adhesives according to the manufacturer's recommendation and using all qualified brands of adhesives suited to edge gluing. These tests consisted of natural aging tests and accelerated aging tests, including cyclic soak tests and weatherometer tests.

Natural aging tests conducted under normal room temperatures up to 15 months showed no appreciable decrease of joint strength bonded by any one of the methods. Results of accelerated aging tests indicated some deterioration of heat-bonded joints, BOTH by electronic heating and hot-pressing and somewhat greater than of those joints bonded by cold pressing. Joint strength provided, however, was well within limits prescribed for this type of wood-glue construction. Varying the length of bonding periods produced no appreciable difference.

Commercially glued products bonded at woodworking plants by electronic heating in which faults were claimed were thoroughly examined and tested by impartial college and private research organizations. Practically every case of joint failure was eventually traced to such causes as poor preparation of stock, improper adjustment or incorrect techniques in the use of electronic equipment, or the use of the wrong adhesive or improper gluing practices.

Electronic gluing operations studied at this point of the survey included woodworking plant applications of such electronic equipment as: edge-gluing presses, plywood and laminating presses, vacuum bag molding equipment, end-to-end bonding units for scarf and finger joints, edge-banding presses, box-making presses, and a wide variety of assembly jig and press arrangements. This equipment ranged from small home-made presses, operating with wood forms covered with thin metal sheets as electrodes and applying pressure through sections of fire hose inflated with compressed air, to commercial automatically-operated continuous

edge-bonding presses with a production capacity up to 20,000 board feet of finished panel per day.

Many explanations of the theory of dielectric heating and its application in electronic gluing were received in the course of this study. One of the best descriptions of what happens in the process of electronic gluing appeared in a clipping provided by a plant operator which is accredited to George W. Stanley, Jr. of Unicel car fame, which states:

"When a wood construction is placed in an electrostatic field through which electrical energy is alternated at radio frequency (one million or more cycles per second) molecules in wood and glue line are agitated at the same frequency, which agitation causes molecular friction and generates heat throughout the construction. This method is known as dielectric heating. The greater the conductivity of the material, the greater the heat generated in a given time. When wood is heated, dense or moist areas heat more quickly. Since glue line contains a high percentage of moisture, it heats faster than wood."

Experience history in woodworking plants has shown that electronic gluing is best suited to large scale production operations where initial cost of equipment is not a deciding factor. This type of equipment is not cheap although it is an efficient and adaptable production tool which has the ability to put heat where it is needed, and may be used to increase production, simplify process operations and improve quality of product. The essence of the electronic gluing process is speed of operation but other factors should be thoroughly analyzed before its adoption.

It is generally recommended that this analysis include consideration of: method of fabrication, species and moisture content of wood to be glued, thickness of stock, maximum-minimum-average stock widths, plant voltage and voltage regulation, dimensions of finished panels or assemblies, rate of production desired and location of service outlets. If the work is such that it may be handled by standard commercial electronic presses, these manufacturers will be glad to make a cost estimation for study and analysis. If the work does not seem suited to production on standard equipment, electronic generator unit manufacturers are the best sources for the information required.

Operating cost and rate of amortization are always a prime consideration. Among the many operating reports studied was a comparative cost analysis made by a cabinet manufacturer offering a comparison of a clamp carrier edge gluing operation with an electronic gluing setup. A digest of this report showed an initial investment increase of almost 300%, a 50% decrease in direct operating costs, 33 1/3% increase in maintenance costs, 75% reduction in floor space required, 66 2/3% reduction in production cost per thousand board feet of panel with better quality of product, and an estimated overall daily savings which will amortize the total electronic equipment investment in 163 operating days of 8 hours each. This represents a return of 184% on the initial capital investment.

When projecting the production potential of electronic gluing it must be remembered that its operation can seldom be maintained for 100% of every working hour. Setting up and tuning the equipment is bound to create some idle time, and the steady flow of wood construction to be bonded may be interrupted for various reasons. Continued cost of operation is also an important factor.

To afford a basis for intelligent analysis of a proposed electronic equip-

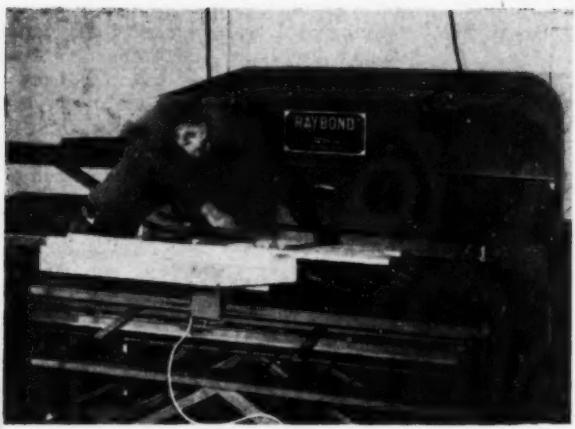


Fig. 2. One-man Raybond electronic press installation at H. T. Cushman plant used to glue up solid birch and maple panels.

Courtesy Electronic Heating Corporation.

ment installation, power requirements for the job to be done at the production rate desired should be projected first to determine the electronic generator rating required, with proper allowance being made for radiation losses. With some types of standard commercial presses, particularly those in which the generator is either manufactured or installed by the press manufacturer, the line transmission losses, standing wave losses in the platens and radiation losses are all taken into consideration by type rating the dielectric generator on the basis of a water load test between the electrodes of the press. When the generator size has been approximated, electronic heating costs may be estimated. To this figure must be added estimated labor cost, maintenance and amortization of equipment. This should provide a reflection of the full load cost.

According to service engineers with whom this was discussed, when the standby operational cost (setting up and work handling costs and about 25% of full load power cost) has been approximated, by adding proportional operating costs per hour, the actual operating cost per hour should be available for comparison with present equipment costs. If this comparison shows the electronic equipment application to be feasible, then technical solution of the type of equipment required and its best application may be worked out readily by any of the commercial electronic equipment suppliers. These concerns are also happy to supply their engineers to help work out the entire problem from start to finish.

Everyone seemed to agree that preparation of stock to be glued is most important in the electronic gluing process. This work is being done satisfactorily with both sawn and jointed edges, where stock edges and faces are flat and square with each other. A moisture content between 8% and 10% seems to be generally preferred and uniform thickness required throughout the length to eliminate excessive air gaps between the electrodes along the glue line. Uniform moisture content is equally important as variation will result in non-uniform distribution of power in the load, so that some glue lines will not be fully cured, and joint failure results.

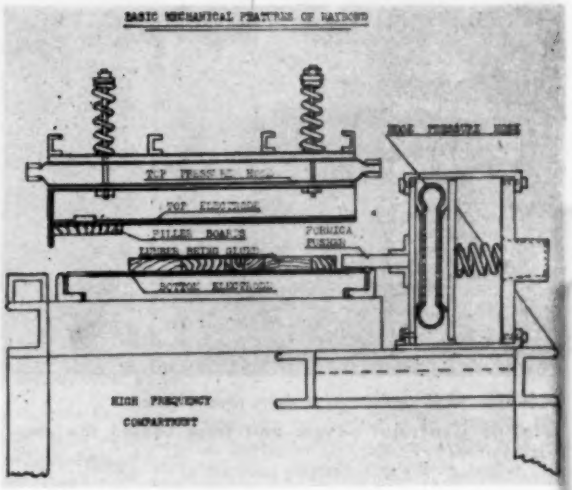


Fig. 1. Construction details of Raybond electronic batch press with basic mechanical features shown.

The uniformity of the moisture content requirements for successful electronic edge bonding is a much disputed point. It must be admitted that the distribution between electrodes in parallel bonding is self selective and henceforth if constant power delivery is maintained through manual or automatic tuning and sufficient time is allowed for curing, all glue lines within the power field will be fully cured. This is further evidenced by our own experimental tests in which individual press loads were composed of stock varying in moisture content from as low as 4% to as high as 17%. Even in these extreme cases, the glue lines were fully cured and the joints satisfactory upon immergence from the press. Subsequent panel warpage and even joint failure could be anticipated for ultimately and particularly where the same specie

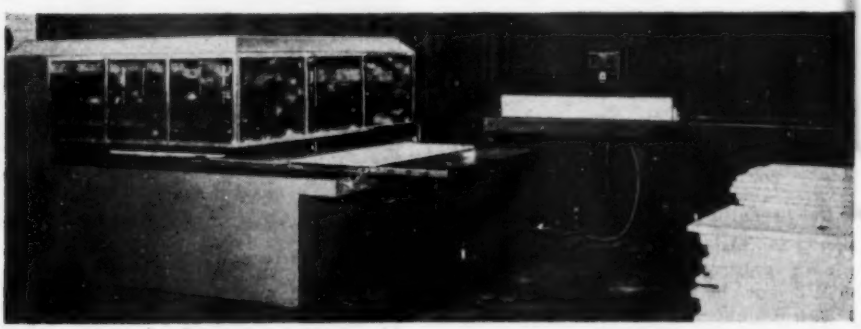
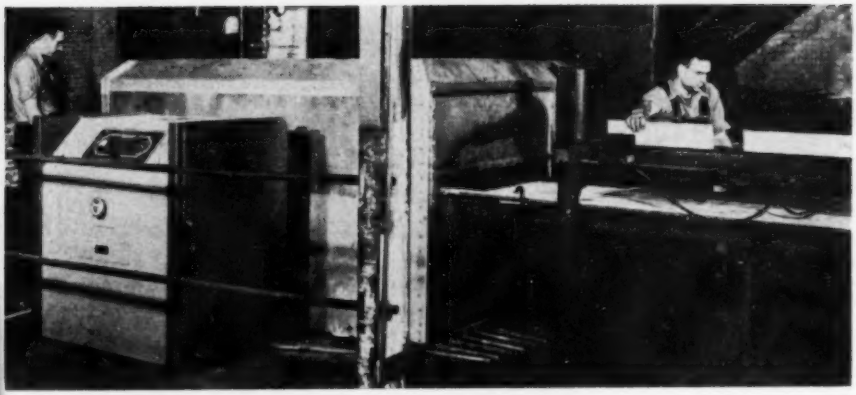


Fig. 3. Plycor one-man Roto-gluer electronic bonding press with PivoTable which revolves to swing charges into and out of press.



Courtesy Earle Hart Woodworking Machine Co.

Fig. 4. Generator powers unit from behind the press out of the way but readily accessible.

and growth of wood was used in single panels, those test panels would return to a consistent average moisture content, uniform throughout the panel. Obviously, the combined shrinkage and expansion of the individual pieces in returning to the main average would result in extreme stresses within that panel.

Uniformity and moisture content are not critical from the standpoint of successful electronic application, but rather falls more within the realm of quality control and good operational techniques.

Maximum side pressure for average panel work is generally considered to be in a range of 350 p.s.i. and higher. Just enough top pressure is used as is required to hold the stock flat, usually from 10 to 15 p.s.i. Application of insufficient pressure is said to be one of the prevailing faults.

It is difficult to generalize as pressure requirements seemed to vary with different bonding units and species. Permissible side pressure was usually lower than the crushing strength of the wood at normal temperatures because heating softens wood fibers near the glue lines.

According to some authorities, pressure should be suited to the stiffness of the wood and power required will vary with the species. This would in-

Courtesy Electronic Heating Corp.

Fig. 5. Two-man operation for gluing short, narrow pieces of varying widths at Hekman Furniture Company, Grand Rapids, Mich., with Raybond electronic edge gluing press.

Courtesy Earle Hart Woodworking Machine Co.

Fig. 6. Hart-Union Electrogluer used at Caswell-Runyan plywood plant, Goshen, Ind., to glue up cores.

dicate that hardwoods with their greater stiffness require more pressure and also require more power because of their density. Panels were observed which had been successfully bonded with pressures as low as 100 to 125 p.s.i. with sawn joints, and down to 50 to 75 p.s.i. with jointed or planed joints. However, we understand that enough experiments have been conducted to prove that these pressures are not always the case. Some of the commercial edge-bonding presses also incorporated provisions to release the top pressure while the side pressure remains on the panel and then to apply top pressure again to produce better joint contact. The purpose of momentarily relieving top pressure and then re-applying it is to relieve any mechanical stresses that might be set up by the application of side pressure and restricted as a result of the comparatively large surface contact of the top platen.

Production figures recently released for this type of bonding equipment, based upon radio frequency heating and use of resin adhesives suited to the particular method of heating (parallel, perpendicular or stray field), give approximate production capacity: for bonding softwoods at 8 to 10% moisture content—250 square inches of glue line per kilowatt can be handled and about 80 square inches set per minute in partial gluing, or in complete gluing—60 square inches of glue line set per kilowatt per minute; for hardwoods at the same moisture content, in partial gluing—125 square inches of glue line per kilowatt can be handled and 40 square inches set per minute, or in complete gluing—30 square inches of glue line per kilowatt per minute can be set.

At the risk of becoming somewhat involved, the following is an attempt to repeat verbatim an explanation given by a service engineer while calculating an edge gluing batch press problem involving the gluing of 24" x 30" hardwood panels of 1" thickness:

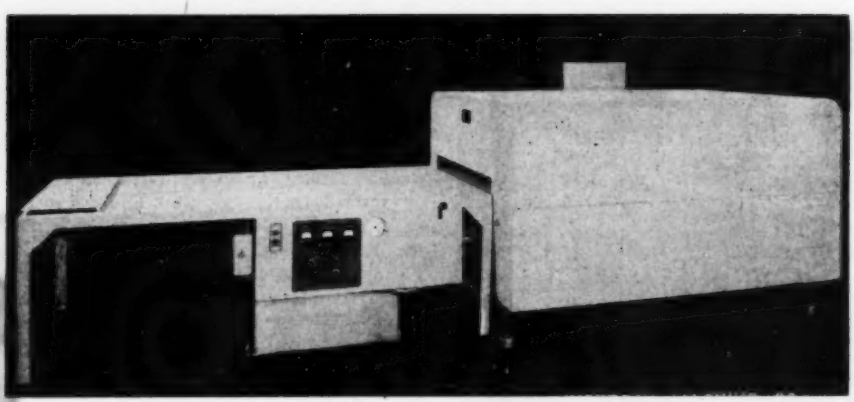
"Assuming the average width of stock used in making up this panel to be three inches, the maximum number of pieces would be eight and the maximum number of glue lines would be seven. Therefore, the maximum glue area to be bonded would be 30" x 1" x 7", or 210 square inches per press load. Using estimated production capacity (previously cited) for hardwoods, a 5 kw. radio frequency generator should setup this panel with a partially cured glue line (about one-third of glue line set) to permit handling and piling for air curing at room temperature in .336 minutes:

$$\frac{210 \text{ sq. in.}}{125 \text{ sq. in./kw.} \times 5 \text{ kw.}}$$

or completely cure the panel (with full glue line set) in 1.40 minutes:

$$\frac{210 \text{ sq. in.}}{30 \text{ sq. in./kw.} \times 5 \text{ kw.}}$$

"Allowing a maximum 15 seconds for loading and unloading and another 15 seconds for operating the press, the average press cycle would be .836 for partial gluing or 1.9 minutes for com-



Courtesy Muskegon Machine Co., Inc.

Fig. 7. Linderbond high frequency edge gluing press with G. E. dielectric heating unit.

plete gluing, to permit production per hour of about 71 partially cured panels or approximately 31 completely cured panels.

"Dividing setup and tuning time of changes required daily for production lots of average size over the 8-hour period of a normal working day, hardwood production of panels in this size range at this press should be in the neighborhood of 2,800 board feet with partially cured glue line or 1,200 board feet completely cured, provided the electronic generator is adjusted to deliver full power with a maximum load."

Batch-type edge gluing presses produce a high volume of bonded stock at relatively low cost, with panel production at intervals rather than continuously. Their rate of production is normally more dependent upon the time required to lay up the press load than actual bonding or curing time. This period may be less than half a minute when large panels the full size of the press are being laid up, or may be as much as four or five minutes when the press load is to be made up of a number of small panels.

In the operation of this kind of press a lay-up of sized and edge-glued panel stock is placed on the loading table in front of the machine while the previous panel is being bonded. At the end of the curing cycle most presses open and the edge glued lay-up is pushed into the press between the electrodes. This action usually serves to push the previously bonded panels out of the press. Hydraulic or pneumatic rams apply sidewise and downward pressure to the panel as high frequency power is turned on at the generator. In some batch-type presses top pressure is applied through lengths of fire hose mounted over the top pressure plate. This permits top pressure to be delivered by inflation of the hose with compressed air and releases it by deflation. Mechanical methods of clamping are also used in some cases.

Feeding methods varied with different press makes. In some the operator pushed the panel lay-up into the press with a special pusher bar; in others, a foot-operated air valve operated a pusher arm. In most press operations seen, an automatic timer connected to the generator was used to

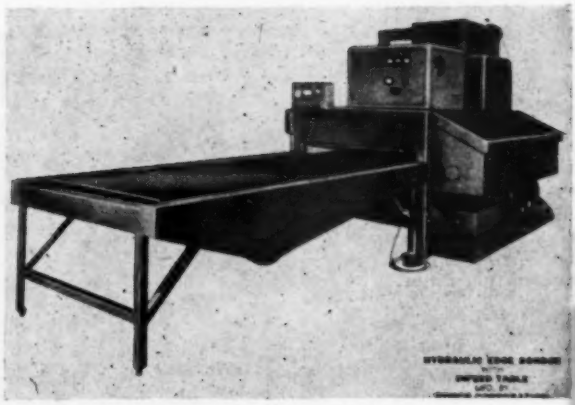


Fig. 8. Frisch hydraulic electronic edge bonder with hydraulically-powered infeed table.

Courtesy Frisch Corp.

control the heating cycle and at the end of the cycle, broke the circuit and opened the press. A review of these edge gluing operations seems to indicate that the use of the smallest size generator and longest curing time permissible with the press production required provided the most economical and efficient results.

Study of electrode arrangement showed both solid plate electrodes setting the complete glue line and strip electrodes curing sections of the glue line were used in these presses. More production is possible at the press with strip electrodes but choice of solid or strip electrodes is usually made on the consideration of whether maximum panel strength is required immediately upon removal from the press, or just sufficient bonding to allow the panel to be handled from the press for curing to maximum strength in piles at room temperature. The latter requirements seemed to be favored in most operations.

Based upon models studied during this survey, batch-type presses are commercially available for bonding core or panel sizes up to 50" x 100", determined by length or width of press electrodes, in standard models. These were powered by radio frequency generator units from 5 to 20 kw. size, with 5 and 10 kw. most popularly used. A 5 kw. generator seemed to be considered sufficiently large to bond panels up to 30" x 36", or about 1,000 square inches in area. A 10 kw. generator was considered capable of handling press loads up to 36" x 96" with partial gluing electrodes. Panel area is considered fairly unimportant. Glue line area commensurate with production requirements is the determining factor for generator size.

Calculations made to determine a particular press selection usually included cost of power, tube replacement, maintenance and amortization of the equipment with due consideration of initial cost and production potential. Initial cost varied with make and size of generator and press. While figures varied somewhat with local power costs and other factors, average operating costs including power, tube replacement and maintenance, ran about 35 to 40 cents per hour.

The economics, dollars and cents

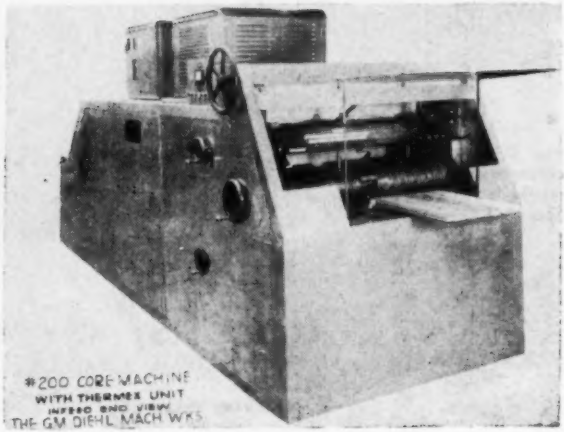


Fig. 9. Diehl-Dosker edge gluer for electronic core bonding powered by Thermex high frequency generator.

Courtesy The G. M. Diehl Machine Works.

value, of electronic edge gluing makes this application most popular. Reports of doubling production with no increase in labor (reduction in many cases) raised the question of how high production has to be for this electronic edge gluing equipment to be practical. Opinions varied so widely it was difficult to arrive at an average evaluation. A consensus indicates a core or panel production of about 3,000 board feet per day to be the economic minimum. Individual panel size did not appear to be a deciding factor, as small panels are cured in sets in a single operation.

In the continuous type of edge gluing press the edge glued stock is fed endwise into the machine by reciprocating ram successively, or continuously by chain or caterpillar drive to be passed through the electrostatic field between the electrodes for bonding. Clamps traveling on the conveyor serve to keep the stock closely butted end-to-end, apply sidewise pressure to the stock and carry it between the electrodes. The panel components are first flattened by pressure rolls or platen and a small air gap is usually provided between the top hot electrode and the wood to allow the stock to move freely as the glue line is being set. Spring-loaded clamps on the conveyor often act as the ground electrodes and arrangement and spacing of these electrodes act to provide partial or complete glue line setting.

These continuous edge gluing presses are high speed production units capable of producing more than 10,000 board feet of bonded cores or panels per day, with an operation that is automatic and continuous and requiring only from 20 to 40 seconds to bond a single panel. As with batch-type edge gluing presses, the cost of these continuous edge gluing units varies with make, size, etc., but the complete cost of a typical continuous electronic edge gluing press and generator ran about $18,000. While operating costs seemed to increase proportionately in comparison with the batch-type press, production was increased in much greater proportion.

The following list will not in all probability include all makes of electronic edge gluing presses currently

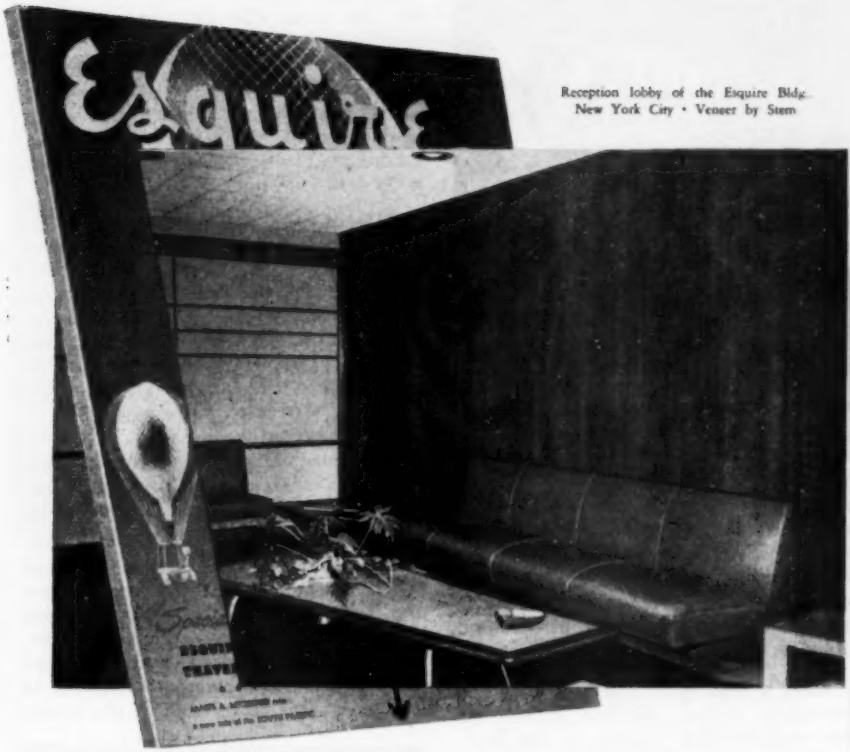


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Fig. 10. Gillespie high frequency edge gluing machine. Infeed view showing hydraulic pressure mechanism.

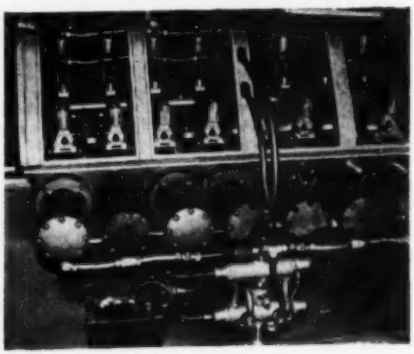
available, but is representative of presses available for study during the course of this survey, which may be considered to be fairly representative of commercial press units in general use by woodworking plants for core and panel production with resin adhesives.

What is said to be the first one-man electronic gluing machine offered to the woodworking industry is the Raybond press manufactured by the Electronic Heating Corp. of Newton Highlands, Mass. This is a batch-type press supplied with generator, glue spreader, loading and unloading tables. (Construction details shown in sketch—Fig. 1.) The standard presses handle panels from 37½" x 50" to 50" x 100" and are powered by generators ranging from 5 to 15 kw. output. Production rates from 3,000 to 8,000 s.f.m. for one man are claimed possible, depending upon machine size and stock lay-up.

In the operation of this one-man press the edge glued lay-up is fed from the loading table sidewise into the press. When the "start" button is pressed, a pneumatic headplate applies pressure to the panel surface to straighten the stock and prevent the panel from buckling. Edge shoes then apply side pressure to press the panel against a tongue attached to the header of the press. When correct edge pressure has been reached, the generator goes on automatically and applies power for a pre-set time interval.

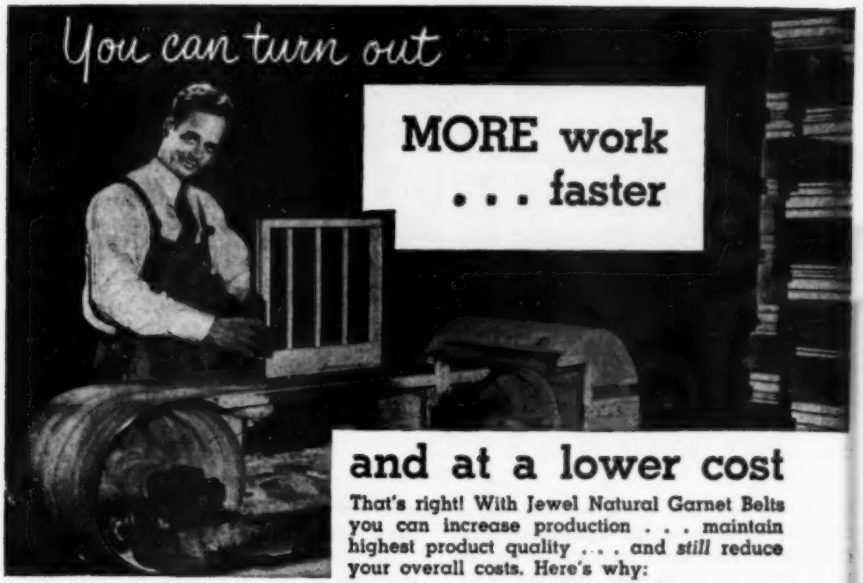
A timer automatically turns off the radio frequency power and releases edge and face pressure in that order, after which the bonded panels are ejected from the press. During the automatic sequence of this Raybond press operation, the operator removes the previously cured panel, edge glues the stock for the next lay-up with automatic travel via conveyor across the glue spreader roll, and lays up the panel on the loading table for immediate feeding into the press after the cured panel is ejected.

In one of the operations observed where the panel assembly was less than the full press width, a filler board was added to the lay-up without glue. The operator advised that this had very little effect on the efficiency of the press unit since most of the power



Courtesy Pico Machinery Company.

Fig. 11. Outfeed view of Gillespie continuous electronic edge gluer showing complete hydraulic system in one unit.



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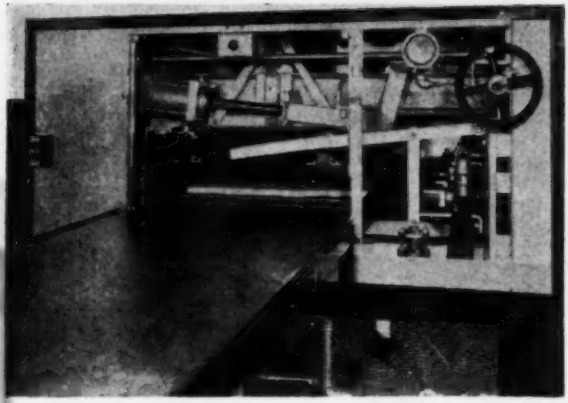
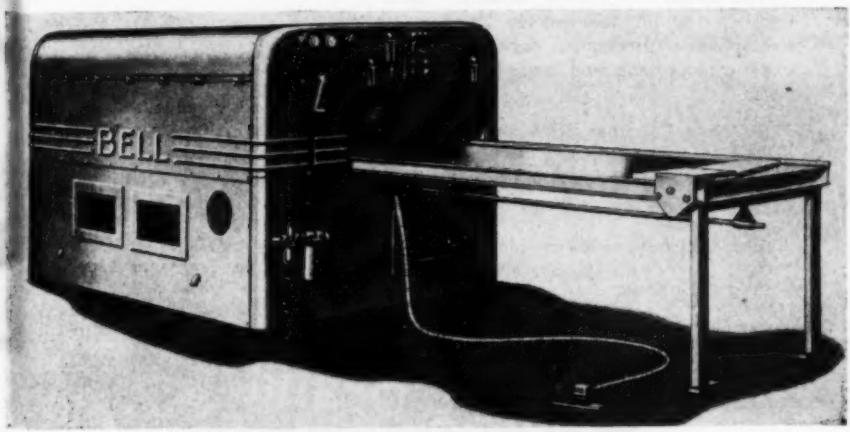


Fig. 12. Weldon Hydromatic wood bonding press for electronic gluing of stock up to 8 inches in thickness powered by Westinghouse radio frequency generator.

Courtesy Weldon Flinchbaugh Company.

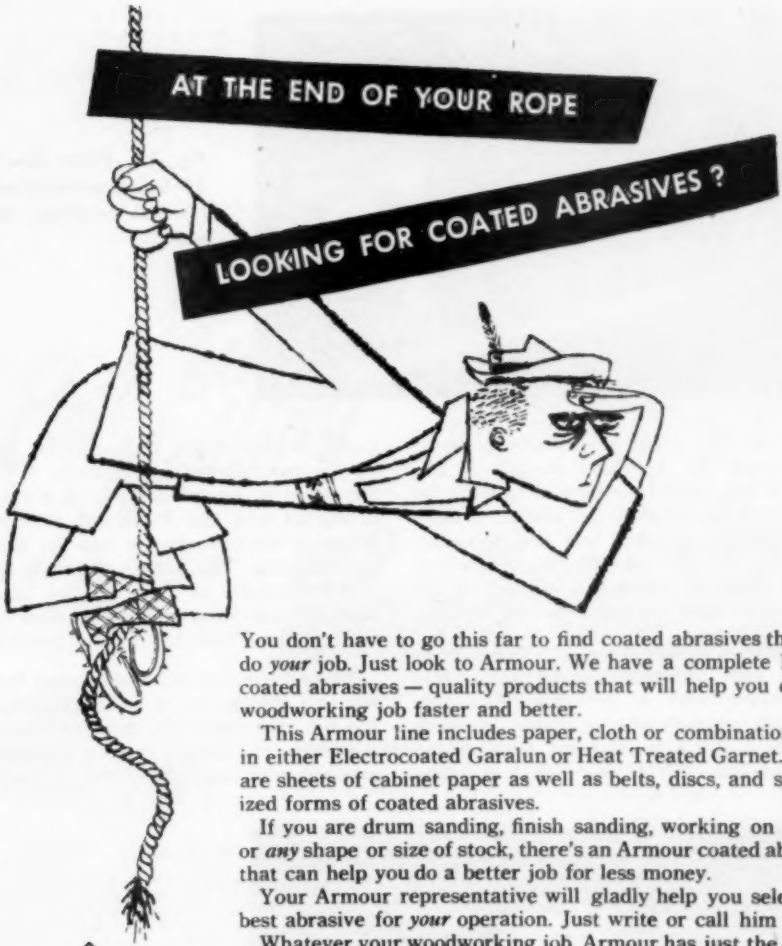
went directly into the glue line rather than into the wood. A typical one-man Raybond press unit installation shown here (Fig. 2) is in the plant of H. T. Cushman Mfg. Company at North Bennington, Vt., where only solid maple and birch panels are produced. Considerabe 8/4 stock is glued up at this press for solid wood chair seats.

Another popular one-man edge gluing machine is the Roto-Gluer, distributed by the Plycor Company, Division Earle Hart Woodworking Machine Company of Chicago, Ill. Designed especially for



Courtesy The Bell Machine Company.

Fig. 13. Bell electronic edge gluing press for bonding lumber cores with automatic cycle and automatic tuning.



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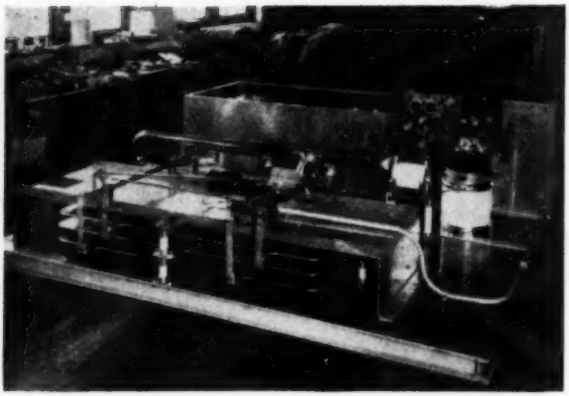


Fig. 14. Front view of 15 kw. generator built for Bell electronic edge gluer.

use in the small plant, this press is powered by a Westinghouse 5 kw. or 10 kw. high frequency generator for heat and a complete installation usually includes a conveyor and glue spreader, equipped with an electric eye which automatically stops the spreader if the operator has not removed the boards.

Instead of employing the usual loading and unloading table, this press operates with a patented PivoTable which permits the operator to work from a fixed position for loading and unloading. While one panel is being cured in the press, the operator lays up the next charge on the table. When the panel in the press is cured, a valve is shifted and the PivoTable revolves to swing the new charge into the press for bonding. The cured panel is delivered directly in front of the operator for unloading so that he does not have to move from his original position.

This one-man press is equipped with top and side pressure cylinders. When the top cylinders raise they lift the top electrode, the side pressure cylinders and the back stop. After the generator

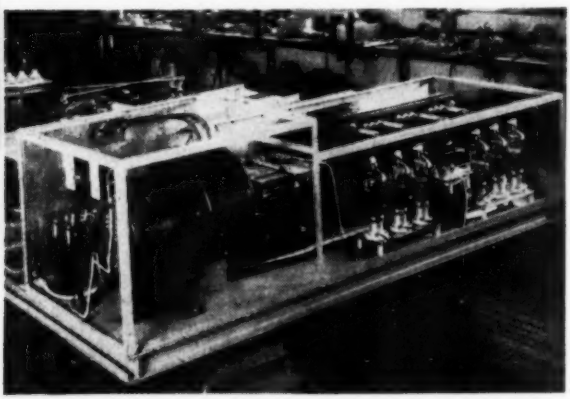
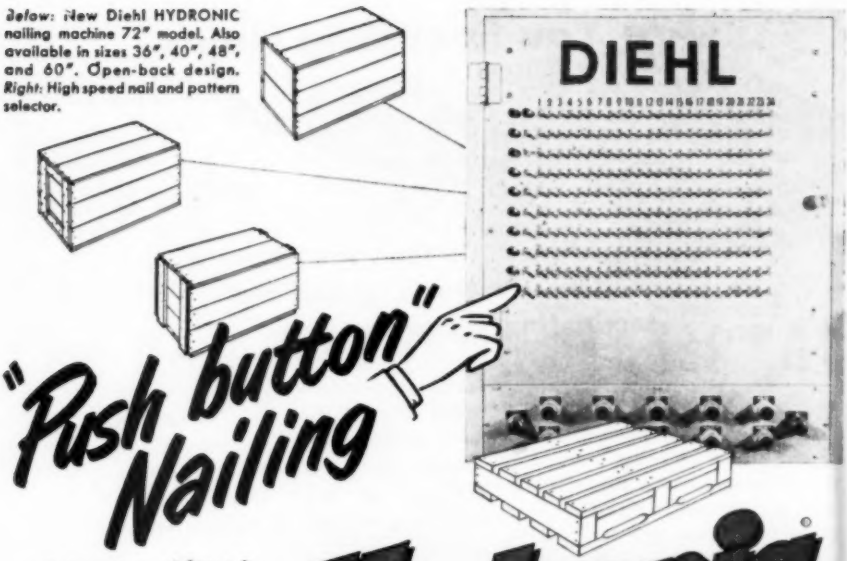


Fig. 15. Rear view of 15 kw. generator used in Bell electronic edge gluer.

Below: New Diehl HYDRONIC nailing machine 72" model. Also available in sizes 36", 40", 48", and 60". Open-back design. *Right:* High speed nail and pattern selector.



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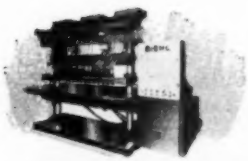

• "Push-Button" Electronic Control

"Push-button" electronic master-control panel on the new Diehl HYDRONIC Nailer—offering combinations of up to 24 nails and 10 patterns—directs high-speed solenoids for positive, split-second transfer of nails from hoppers to nail chucks—push-buttons also adjust work table for greater efficiency.

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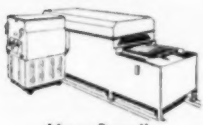

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has been adjusted and tuned for the size and species of panel to be made, a center switch is turned to automatic for press operation. When the panel lay-up has been swung into the press, the "start" button is pressed to energize a solenoid valve to close the press and a pressure switch provides a time delay before the generator cycles. An automatic timer on the generator controls the heating cycle. At the end of the cycle, the timer breaks the circuit and opens the press to allow removal of the cured panel.

The Plycor one-man Roto-gluer press (Fig. 3) will handle core and panel sizes up to 40" x 68" and is said to have production capacity of 4,000 to 8,000 sq. ft. per day. In some installations this press was equipped with interchangeable electrodes to permit assembly and panel-to-frame gluing. As shown (Fig. 4), the generator is

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usually installed behind the press out of the way but readily accessible.

One-man electronic batch presses are designed primarily for operation by one man but in some cases many pieces have to be glued up, sometimes as many as 40 to 60 pieces have to be handled per load. In such operations a single operator cannot feed the machine as fast as the panels can be cured. Two men are used in this type of operation to maintain high production efficiency; one man setting the stock on edge for travel over the glue roll and stacking cured panels onto a truck or off-bearing conveyor for removal from the press area, and an operator devoting his entire time to taking stock from the glue spreader conveyor, laying it up on the loading table, and feeding it into the machine. This method divides the work load equally and results in a high pro-

duction rate in bonding panels with many pieces of short and narrow lengths.

This type of an operation is shown (Fig. 5) with a one-man Raybond high frequency edge gluing press being used at the Hekman Furniture Company plant at Grand Rapids, Mich., to glue together short and narrow pieces of varying widths. The handling problem created here involves up-ending the stock, arranging it on the loading table and removing it from the unloading table. Two men are required to keep up with the productive capacity of the machine.

A similar operation in which the panels travel through the press and a 3-man crew is required is shown (Fig. 6) with a Hart-Union Electrogluer in the plywood plant of Caswell-Runyan Division, Newport Steel Corp., Goshen, Ind., to glue up cores. Panels are assembled on the feed table equipped with a pusher bar. The pusher bar pushes the panels between the press feed rolls for feeding to traveling clamps which apply side pressure and carry the panels through the machine and under a floating electrode. This press is known as a batch-continuous press and has a production capacity estimated at 8,000 to 10,000 sq. ft. per day.

The Plycor Company have also adapted their automatic lumber press for electronic gluing where continuous, maximum production of glued-up panel stock is required, by removing one of the lower steam platens and installing an insulated "hot" electrode in its place. The upper platen serves as the ground electrode. In operation, the lumber is first heated by the steam platens to cure the glue squeeze-out and a portion of the glue in the joint. When the stock moves over the "hot" electrode, the balance of the glue is cured

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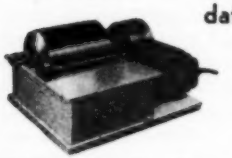

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almost instantly. This combination lumber press is said to have run at speeds as high as 20 lineal feet per minute.

One of the newer units recently introduced for electronic edge gluing is the Linderbond high frequency edge gluing press, manufactured by the Muskegon Machine Company of Newburgh, N. Y., better-known for their Linderman automatic wood fabricating process. This press is powered by a 9 kw. General Electric dielectric heater and is designed to bond panels up to 42" x 84" in thicknesses of ¾" to 2". It carries a large infeed lay-up table and operates with hydraulic panel feed and hydraulic pressure, with top flat pressure of 5 to 10 p.s.i. and edge pressure of 200 to 300 p.s.i., with electric control and timing and manual control of feed and repeat of operation sequence (Fig.7).

Another hydraulic electronic edge bonder, used considerably in the production of core panels, is made by the Frisch Corporation, Chicago, Ill. (Fig. 8). This machine features a hydraulic system that is part of the press and an arrangement of guided pusher bars, 2" wide and 2½" on center, individually

actuated to permit making cores of any length less than the maximum (60" or 80" according to model), or to bond up a platen full of short cores of varying widths without requiring special adjustment. Standard 5/8" thick pusher bars handle cores from 3/4" to 2 1/2" thickness and special bars are provided for other thicknesses of cores. Quick vertical adjustment of the entire bank of cylinders and pusher bars is made by means of a handwheel at the infeed end of the press.

The hydraulically-powered infeed table is controlled by foot switch from either end of the machine and a safety interlock prevents the infeed table from starting until the press is fully open and pusher bars are retracted. The multiple pusher bars are each driven by their own individual hydraulic cylinder so a fluid pressure is provided along the entire edge of the core. When press loads of short panels are run with varying width build-ups, these pusher bars provide pressure along the entire length of the panel, automatically compensating for difference in width. None have to be shut off when running short loads, as they simply travel the full length of their stroke and stop.

Vertical pressure is adjustable to 7 p.s.i. and side pressure up to 250 p.s.i. Bonding pressure is applied horizontally by the guided pusher bars. Standard panel sizes are 30" x 60" and 42" x 86". Stepping on the foot switch causes the load to be carried into the press and the press closes automatically. Edge pressure is applied by pusher bars and the press is "breathed," momentarily relaxing vertical pressure to assure full bonding pressure, and high frequency power is automatically turned on as top pressure is again applied. At the end of the curing cycle, the timer shuts off the high frequency generator and opens the press to discharge

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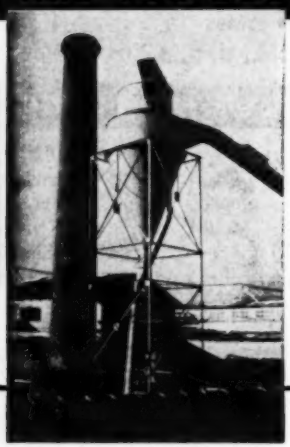

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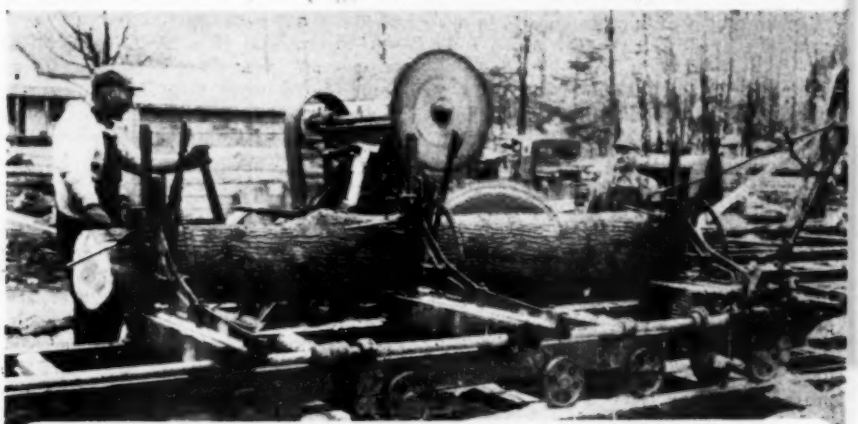

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the cured panel and receive the new charge.

The Diehl-Dosker edge gluer is a continuous type electronic edge gluing press said to have a production capacity of 14,000 to 20,000 board feet of core or panel per day. This machine is manufactured by the G. M. Diehl Machine Works, Wabash, Ind., and is powered for heating by a Thermex 10 kw. high frequency generator.

As edge glued stock is fed into the press the loose panels are flattened by rigid horizontal pressure rolls and just beyond the point of downward pressure release, side pressure is applied automatically and progressively by special spring-loaded clamps as the panels move under an upper electrode suspended about ⅛" above the panel in such a way that it swings free with the movement of the stock. The clamps form the ground electrode to complete the circuit. The live electrode unit is of expanding tubular design and is expanded for width as required.

The speed of this machine may be varied from 4 to 30 lineal feet per minute and an automatic selector for width of panel is provided so that when the selector bar is set, uniform pressure is applied on every clamp. The maximum width that may be glued in the standard press is 37" and the shortest length is 15". The maximum length is indefinite as lengths outside the capacity of the machine may be glued up progressively. Cores and panels of ¾" to 2" in thickness are glued in this press.

The Gillespie high frequency edge gluing machine is a continuous edge gluer manufactured on the West Coast by Pico Machinery Company, Los Angeles, Calif. This machine is made with press sizes from 45"x75" to 50"x 100", with the unit generator 15 kw. and on the 50"x100" press, two generators with motored controls are used. These are usually on the 37 megacycle frequency. The average production of this press is said to be 1,000 square feet of panel per hour on 4/4 or 8/4 lumber on 10 to 20 panel size changes per day. Where size changes are less than 10 per day, production is said to increase up to 1,400 sq. ft. per hour.

The generator has automatic tuning (Fig. 10) and the machine features a Z-pattern of gluing (not "stop" gluing) produced by having the cold electrodes in the press conveyor always stop-staggered to the top hot electrode to get almost 100% concentration of the high frequency. Feed is by endless conveyor and pressure is provided by positive acting hydraulic cylinders and both electrodes and on the edge of the panel. The operation has full regulation of hydraulic pressure from 20 to 400 p.s.i. No air volume is required since the machine has a complete hydraulic system in one unit (Fig. 11). No thickness adjustment is required as pistons merely come down until they hit the stock. If width does not come within six inches of the side piston, dry dummy filler boards are used to compensate for the difference.

Automatic operation is timed to start the conveyor to pick up stock from the loading gates, stop with the stock under the electrode, start the edge pressure, and after completion of a pre-set cycle, radio frequency power is turned off, edge and top pressure released and the conveyor started again to remove the stock. Panel stock is fed from a glue applicator unit to the press.

A heavy duty batch type edge bonding press (Fig. 12) designed to apply extreme pressures and to glue stock up to eight inches in thickness with only minor adjustments is the Weldon Hydromatic wood bonding press, manu-

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factured by the Weldon Finchbaugh Company, York, Pa., in platen sizes from 26"x26" to 50"x100". This company started building high frequency electronic gluing presses in 1946 and have the majority of their installations in plants making open face hardwood panels for furniture and for gluing heavy wood constructions for general use.

Although one-man operation is said to produce up to 9,000 board feet of bonded stock per day, this requires considerable time out for mixing glue and stock handling. Due to the size of the stock commonly glued in this press, a two- or three-man operation greatly increases production and keeps the press in continual operation. The general installation includes a hydraulic infeed table and automatic glue spreader.

A 10 kw. Westinghouse radio frequency generator is used to supply bonding power and hydraulic power is used for pressure, operated by a fluid power packaged hydraulic unit so no additional power equipment is necessary. A pressure gauge is provided to permit proper selection of clamping pressures and handwheel adjustment of cylinder height provides equal distribution of pressure for all thickness. This press automatically re-cycles when improperly adjusted. The hydraulic infeed table will operate only when the press is open.

Push button control provides a completely automatic operating cycle in which the platen closes to straighten the load, press doors close, side clamping pressure is applied, high frequency heating starts as indicated by a red indicating light, a predetermined timing cycle shuts off the generator current automatically releasing clamping pressure, opening the doors and raising the platen for reloading.

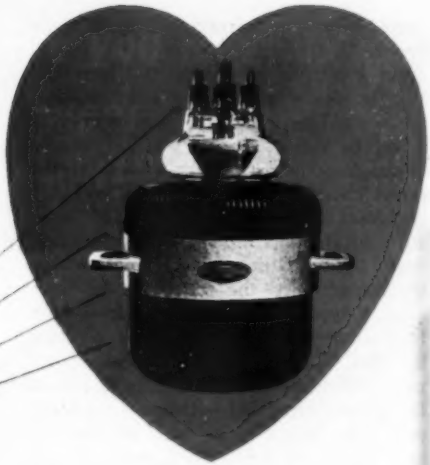
One of the more outstanding installations of this press was seen at the Saco-Lowell Shops at Bideford, Me., where hardwood billets are glued up for textile machinery use. These billets are of hard maple, 7½ inches square and up to 16 feet long, carrying a deep glue line bonded with the steel spindle in place in the construction.

An electronic edge gluing press (Fig. 13) for bonding lumber cores and hardwood open-faced stock up to 4" thickness with an automatic cycle that is much used for building up panels from short and narrow stock is produced by the Bell Machine Company, Oshkosh, Wis., in two standard sizes: 40"x80" and 50"x100"—both with solid electrodes. The first is powered by a 10 kw. generator and the latter by a 15 kw. generator (Figs. 14, 15) of the high frequency type manufactured by this company for their own use. The 15 kw. generator can also be applied to the smaller machine for heavy hardwood laminating work. Both presses have a maximum opening of 4" and are used for gluing both hard and soft woods in thicknesses from ⅝" to 4".

Clamping pressure is applied by a bank of 9" diameter air cylinders each with two point pressure application through a self adjusting equalizer yoke permitting as much as 4" width variation for panels in tandem throughout the entire press length.

From the time the operator touches the foot pedal, operation is entirely automatic. Stock is pushed into the press which then closes automatically. As the press closes, high frequency power is turned on and automatically adjusted to full generator output on whatever load is in the press. The automatic tuning feature allows panels of varying thicknesses and varying number of glue lines to be glued with no manual adjustment of the high frequency unit. At the end of the curing

What You Should Know about the HEART of your Electronic Bonding Equipment



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cycle, power is turned off by a cycle timer.

An electrical switch in the feed line to the side cylinders automatically turns on the generator and serves as a safety against pre-cure in case of inadequate pressure application to the press charge. A single handwheel adjustment centerizes the point of pressure application for the entire cylinder bank on any thickness of stock within the capacity of the machine.

In a typical installation a Bell high frequency edge gluing press is used by the Wisconsin Butter Tub Company, Marshfield, Wis., to glue up panels for staves, tops and bottoms from scrap pieces too short to be used in the sash and door industry. This stock is laid up in 16"x16" panels of 1" thickness and are cured in the electronic edge gluer, eight panels to a press load, in a curing time of less than a minute.

An unusually high productive installation of this machine is reported in the gluing of redwood panels at the Pacific Lumber Company in Scotia, California, where two men are gluing up 16,000 board feet of stock per eight-hour day.

To enhance full productivity from their batch type press, the Bell Machine Company also produces a conveyor-type glue spreader with a power feed transfer mechanism that delivers the material with glue applied to one edge to a position immediately accessible to the press operator who distributes that material to the feed table. The spreader is sufficiently wide and large to accommodate a full press charge in one handling. It is loaded by the off-bearer at the outfeed end of the press.

Lack of space prevents our including descriptions of more installations in this month's installment. We shall include additional descriptions of other equipment in the December issue.

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Development and Care of Industrial Electron Tubes for H.F. Heating

This subject is very important to the entire field of electronic gluing. For that reason we have included a short discussion of it in this installment of our article.

Industrial electron tubes (oscillators and rectifiers), now used in electronic gluing applications, are available only through the foresight and willingness of vacuum tube manufacturers to cooperate with industrial equipment manufacturers in perfecting tubes suited to this particular use. If these improved industrial electron tubes had not been available during the development stages of high frequency heating, there would be no electronic gluing equipment in use today; for the development of a good industrial vacuum tube was the determining factor in the final acceptance of industrial dielectric heating units by industry.

As used in dielectric heating applications, the rectifier tube is a two-element tube called a diode, containing a cathode filament and an anode plate. For dielectric heating it is usually used in a 3-phase full circuit to convert alternating current to direct current. The oscillator tube is a three-element tube called a triode, with a cathode filament, anode plate and grid. The grid is the control element which contributes immeasurably to the efficiency of this tube. All dielectric heating equipment is centered around the use of high power oscillator tubes which act as high speed switches to break the direct current into pulses of desired high frequency.

In dielectric heating application a single rectifier tube is only 50% efficient, for when the anode plate is positive with respect to the cathode filament and alternating current is used, current flows between filament and plate just half the time, or half a cycle. Since dielectric heating requires continuous steady current, the rectifier tube in this form is not practical for high frequency application. Therefore, two rectifier tubes are usually connected in the circuit of industrial electronic units so that the plate of one is positive and the plate of the other is negative to provide continuous uni-directional current.

The single rectifier tube is commonly known as a half-wave rectifier and the double-tube hookup as a full-wave rectifier. In a typical electronic generator arrangement six rectifier tubes would be used in the 3-phase full circuit, two for each phase. Most rectifier tubes are gas-filled and operate on a similar principle to neon tubes, in that they give off a bright blue color when in operation to rectify current by ionization of the gas within the tube.

When vacuum tube oscillators are properly tuned, they pass current which alternates at frequencies as high as 30 million cycles per second. The exact frequency of alternation and voltage of current depends primarily upon tuning of the electronic generator and the load to which it is connected. It was the development of this oscillator tube which produced electronic gluing equipment as we know it today. In dielectric heating of the kind used for electronic bonding the frequency used is always in the order of millions of cycles per second, and the only method for producing such electrical energy is the vacuum tube oscillator.

One of the most interesting explorations of the introduction and development of industrial electron tubes for high frequency heating was reported recently by J. Wesley Cable, consulting engineer specializing in the high frequency heating field and author of a new book, "Induction and Dielectric Heating" published by Reinhold Publishing Company.

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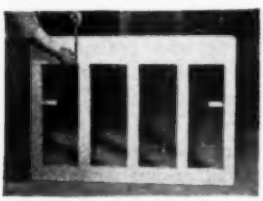

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Observing that induction heating was the first form of high frequency used in industrial applications, Cable pointed out the fact that earlier developments in the fields of electrical heating and radio communication provided two sources of high frequency energy to the induction heating field, the Tesla spark-gap oscillator and the Alexanderson generator developed for radio communication for high power installations.

The spark-gap oscillator produced electrical energy from frequencies of around 30,000 cycles per second up to some hundreds of thousands of cycles, and induction heating could be performed successfully within this range. The Alexanderson generator had a top frequency of about 15,000 cycles, and this energy was suitable for a great percentage of induction heating applications.

The use of these sources of high frequency energy for induction heating was somewhat limited. The spark-gap converter could only be built in small power output units and required considerable maintenance to hold the operating characteristics of the equipment constant. As a result, precise control and duplication of results were difficult to obtain, due to changing frequency and other electrical characteristics of the unit during operation and applications of induction heating involving large amounts of power could not utilize the spark-gap converter.

The only limitation of the motor-generator unit was frequency and it soon became the heart of high frequency induction heating equipment. As induction heating was developed to perform a wide and growing variety of specific applications, a definite need for electrical energy at frequencies of 200,000 to 500,000 cycles per second was indicated. This required the development of a new source of high frequency energy because the spark-gap converter could not be built economically with sufficient power output to do the job, and the motor-generator was too low in its output frequency.

During the period of early development and use, tube failures were often caused by mechanical shock and vibration. Eventually it was realized that oscillator tubes designed for radio transmission were not suitable for use in industrial service, and that if industrial equipment was to be successful, tubes of special design would have to be developed for this service.

Reporting in the Cathode Press the results of analysis of tube failures which led to the design of the improved high power vacuum tube for high frequency heating, Dr. H. D. Doolittle, director of high frequency development and

engineering at the Machlett Laboratories stated:

"In analyzing vacuum tube failures it is obvious that the principal troubles are (1) seal breakage; (2) shorting grid to cathode due to (a) weak seals or (b) warping of the high temperature filament; (3) excessive filament temperature causing rapid evaporation of cathode material; (4) overheated anodes with heavy scale formation and premature failure due to anode puncture; (5) excessive grid dissipation resulting in grid distortion; (6) gassiness due to momentary overload, etc. Fortunately most of these evils can be rather easily corrected. There is, however, no cure for excessive filament temperature except getting a tube with sufficient emission to do the job."

He further advised that Machlett Laboratories, with over 50 years of electron tube experience, has redesigned existing tubes to cover the power range from 5 to 100 kw output power, using the best possible techniques to provide strong seals, grid and filament structures free of strains, thoroughly outgassed parts and thick copper, high dissipation anodes.

The cooperative development program by tube manufacturers and industrial equipment makers has resulted in the superior performance - tested tubes now available for use in modern electronic industrial units. All vital elements within the tube have been carefully examined to produce a tube rugged enough to withstand mishandling and the more severe conditions of industrial service. New materials and production methods have been developed for its manufacture.

Space within this article does not permit our discussing the electron tube as fully as we should like. However, we should like to include the following statements about electron tube life. Long tube life is possible, we are told, by paying proper attention to maintenance and operation.

Industrial electron tube life is described by Ed Winlund of Westinghouse as "Primarily a matter of (a) experienced tube design, (b) experienced generator design, (c) good line voltage, and (d) use of equipment within manufacturer's rating."

Basic factors affecting electron tube life as listed by Charles Singer, assistant chief engineer of radio station WOR, New York City, are (1) filament voltage, (2) plate voltage, residual gasses, (3) fatigue of metal parts, (4) heating and cooling cycles, (5) efficiency of cooling system, (6) efficiency of transmitter, maintenance and associated protective relays, and (7) care of spares and tubes in storage.

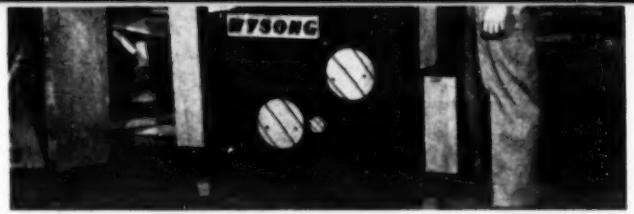
Too little attention is paid to inspection of tubes when they are first received. Some failure is traceable to mishandling in shipment. If the shipping package shows evidence of rough handling, the delivery bill-of-lading should be receipted "accepted, subject to concealed damages," so that if when the tube or tubes are unpacked and damage is discovered, the carrier's agent may be made to inspect the damage within 15 days to validate a damage claim.

It is also good practice to further inspect the tube with an ohm or resistance meter. Connection of the meter to two filament posts should check continuity, or practically dead short, the correct value being given as "filament cold resistance" in technical data of the tube concerned. Connection of the ohm meter to one filament and one grid post of an oscillator tube should indicate open circuit or infinite resistance. Most tubes are operation-tested before shipment, so any variation from stated conditions may be due to mishandling.

Wysong & Miles

SAVE HOURS with WOOD-LOK®

Leather Filleting with WOOD-LOK at the plant of Wysong & Miles Co., Greensboro, N. C. WOOD-LOK's long open assembly time — 5 to 10 minutes — permits accurate registration of fillets. Strong bond allows them to shrink tight after glue has set. And with WOOD-LOK, operations are clean and can be conducted at the same speed in summer and winter.



Pattern for a 12 Gauge, 144" Squaring Sheer Machine — complete with cores and inserts — all laminated and assembled with the finest craftsmanship. WOOD-LOK's fast set saves many hours of assembly time for Wysong & Miles — who are leaders in the field of woodworking machinery and special machinery for sheet metal and heavy metal-machining operations.

Patterns Move from One Assembly Operation to the Next without lag or interruption, thanks to WOOD-LOK's high speed of set. Because of the unique requirements of large size pattern making, Wysong & Miles need the high strength, durability, long open assembly, and fast set that they get with National's WOOD-LOK. We'll be glad to compare WOOD-LOK's initial cost, final cost, and the overall production savings it can bring you as compared to your present adhesive. Just write—

Laminating Pattern Blocks. WOOD-LOK's wide working range permits accurate assembly of critical parts. Fast set facilitates handling after assembly, saving labor costs and shop time. Wysong & Miles' long experience in manufacturing the finest woodworking machinery makes them excellent judges of wood adhesives.

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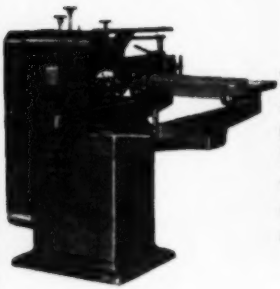
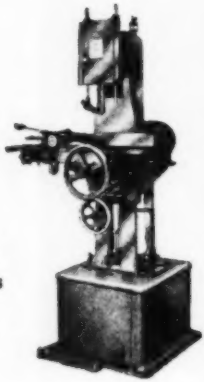
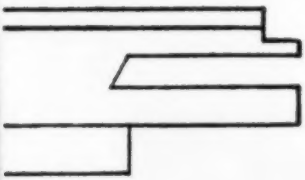
Headquarters for Sash Machinery and Tools



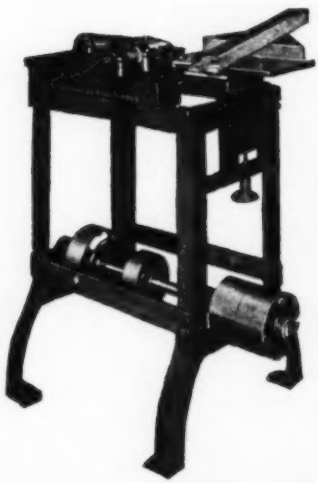
Powermatic Tenoner and Check Rail Slotter — ball bearing, Motor driven. Finish top and bottom check rail in one operation.

Powermatic Chain Mortisers made in 2 Styles. Foot feed and Automatic hydraulic power feed for chains up to ½" in width.





Champion Plow and bore machine for old reliable check rail windows using sash cord and pulley.



Champion Sash Relisher, for all size windows. Ball Bearing.

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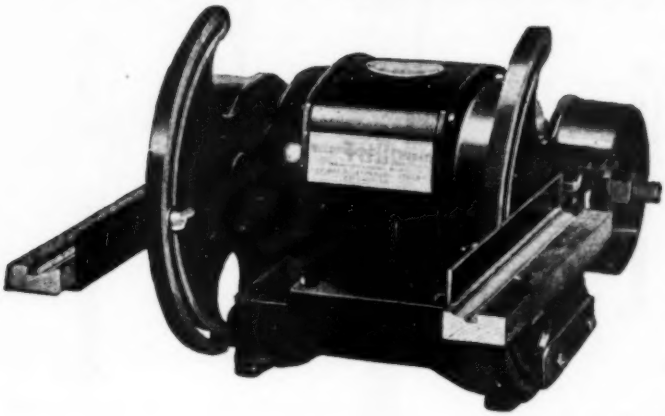
Knourek Bench Type Electric Sash Trimmer



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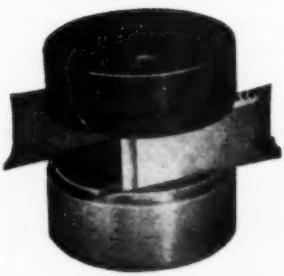

Ball Bearing
Lock Edge Collars

Knourek Patent Ball Bearing and Schmidt Lock Edge Safety Collars eliminate friction resulting in smooth shaping with safety.

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SECTION

Spray Painting

PART 1

EQUIPMENT

By L. W. Lammiman, Technical Service Manager, The DeVilbiss Company

THE purpose of this article is primarily to acquaint those interested in the application of materials by spray painting process with some of the fundamentals that are essential to good finishing. With a thorough knowledge of these essentials it is easier for the man behind the gun to co-ordinate the tools and materials to production, quality, workmanship, economical operation and production speeds to meet the requirements of plant management.

Designing the Spray Gun

The spray gun engineer in the design of a spray gun must give consideration to many practical problems that are confronted in common usage of the product. However, through years of experience, it has been learned that the average operator is capable of controlling a spray pattern 10 inches wide and is able to direct it at large areas to be finished with the least amount of difficulty when holding the gun 6 to 8 inches from the surface.

The engineer has proved how far the gun must be held from the surface in order to control the thinner or reducer loss from the mass during the process of application. The distance found to give best results is 6 to 8 inches from the surface. At this distance, an average thinner loss of around 20% occurs during the spray application at ordinary spraying pressures. If the gun is held at greater distances from the product being sprayed, greater thinner losses take place and defects in finish, such as dry spray, overspray or excessive orange peel, are the result.

Two things take place when the trigger of the gun is pulled. One is the atomization of the solid contents of the material, such as gums or resin, nitrocellulose, or color pigments. The other is the vaporization of the thinners or reducers, and this is what accounts for our thinner losses during travel time of the material between the gun and the surface being coated.

Close-up of a spray gun manufactured by the DeVilbiss Company.

Types of Guns

Spray guns are designed to perform with different types of material feed. While their general appearance is the same, the atomizing and fluid metering components differ according to the feed employed.

The suction feed gun consists of a spray gun and a material cup. With this gun, the material is siphoned from the cup by the air passing through the spray gun.

The spray gun used with gravity feed material containers is similar in construction and design to the gun used with suction material feed. Many times it is the same gun. This depends on the material in use.

The spray guns used with pressure feed tanks and pump equipment are the same type as for other material feeds but are equipped with air caps, fluid tips and needles designed for this type of equipment and feed.

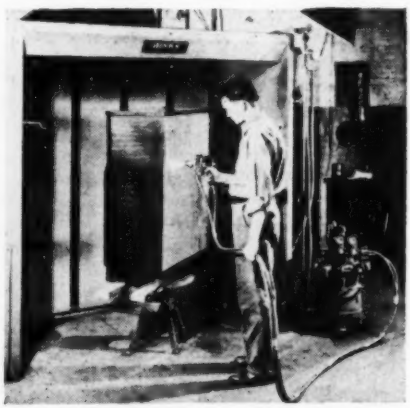
Using the Gun

The essential parts of the spray gun are the fluid metering nozzle and the multi-holed air cap. Their relationship is highly important for the best quality results. The improper relationship of atomization air and pressure at which material is fed to the gun affects the economy of finishing. Profits can literally be blown away if proper coordination of pressures is not adhered to. Atomization air pressures should be kept as low as is consistent with speed required and quality desired. Material savings, as high as 30%, have been made possible by a close adherence to proper spraying pressures. A table of the recommended pressures for atomizing the various types of materials is given with pressure readings recorded at the air inlet in the spray gun handle.

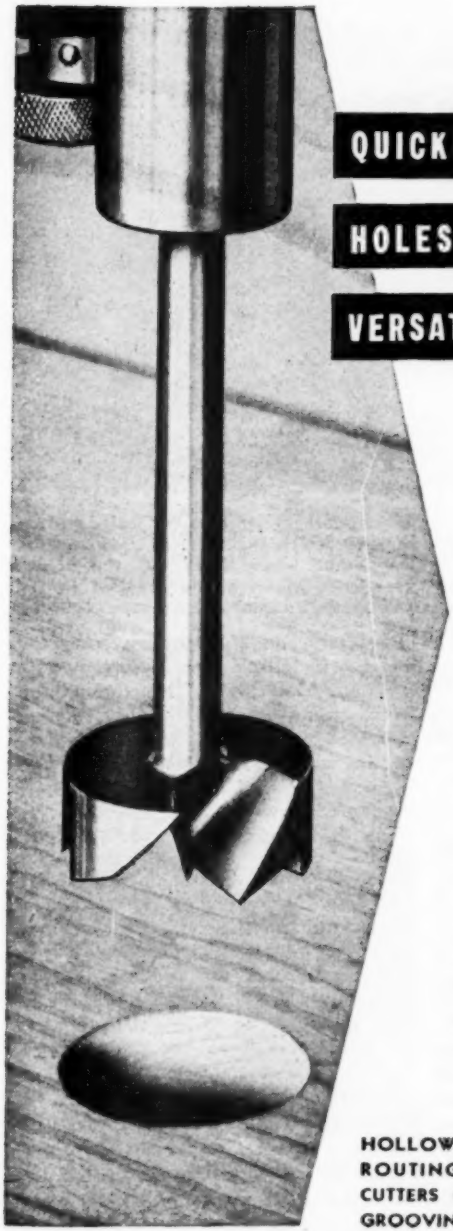
Table of Atomization Air Pressures

Stain	25 lbs.
Wash Coat	35 lbs.
Filler	25 - 30 lbs.
Sealer	35 - 40 lbs.
Glazing stain	35 - 40 lbs.
Lacquer stain	35 lbs.
Lacquer	40 - 45 lbs.
Varnish	40 - 45 lbs.
Enamel Undercoat	40 - 45 lbs.
Enamel	40 - 45 lbs.

These figures naturally are dependent upon the equipment being used.



Operator spraying in a booth manufactured by the Binks Company.



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The spray gun must be equipped with the proper combination of related parts designed for performance under these conditions. Pressures on material do vary, depending upon the consistencies of the material used, the size and length of hose conveying the material and the speed of operation.

Spray Booths

Spray booths are the metal enclosures in which the spraying operations are conducted. They may be of either a direct exhaust type, expelling spray vapors to the outside, or of the air wash chamber type in which the spray is drawn through water curtains where the forceful water wash beats out the solids and accumulates them in a water tank. In this case, practically clean air is expelled to the outside, fire hazard is reduced and expensive stack maintenance eliminated. Spray booths are so constructed as to become a station on the conveyor through which the carrier passes. Size of booths should always be large enough to give the spray operators plenty of time and room to carry on their work. On the other hand, man the booths with the number of operators to efficiently and economically coat the articles. It is quite frequently necessary to have two operators in a 20 foot booth so as not to rush an operation unduly. Keep the booth walls and floor free from any material accumulation. Cleanliness is the result of good housekeeping and is of prime importance in any finishing room.

In large finishing installations involving a number of spray booths, consideration must be given to replacing the air drawn out by the exhaust fans. If this is not made up by an air input system, it will be drawn from the plant proper, carrying with it whatever dirt and dust is present. An air replacement system will supply the volume of air required to offset that drawn out. It also filters and, if necessary, heats the air. By installing such a system with a capacity 10% higher than the amount of air exhausted, the finishing room is actually put under a slight pressure, spilling air out of it rather than drawing air into it. Thus, if cleanliness is maintained within the department, clean finishing should be the result.

Spray booth illustrating the water curtain through which the spray is drawn. Here the water wash beats out the solids. Practically clean air is expelled to the outside.

Material Feeds

There are four types of material feeds. These are: suction, gravity, pressure tank and pump feed. The pressure type of feed is the one most universally used. This material feed is either from pressure tanks or by pumps. Pressure tanks are commonly used but should be of the size to require as few refillings as possible. It is recommended that they be of sufficient capacity to require filling only once each day. For those materials with a tendency to settle, the material container should be equipped with mechanical agitation. If such materials

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ReNew increases sanding machine efficiency . . . paper lasts longer . . . less changes necessary.

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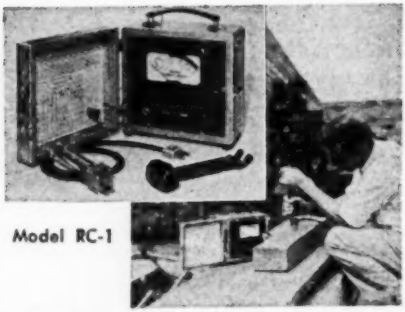

Model RC-1

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"We have been using the Moisture Detector for approximately four years in our air drying yard and in conjunction with our dry kilns," writes Mr. Seidel. "We use it constantly to check the moisture content of incoming lumber, to select air dry stock from the yard stacks and to check outgoing orders.

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are not kept thoroughly mixed, the finish will lack in uniformity and, in addition, plugging of spray equipment is likely to result. Such materials as clear varnish, lacquer and sealer received in consistency ready-to-use, are often pumped from original container directly to the spray gun. By such a method an economy in the handling of material is effected. Note that non-pigmented materials were recommended for use with such pumping method. Pigmented materials are abrasive and cause excessive pump wear.

Air Regulation

To control air pressures and to assure the use of cleansed air, a device is used which filters, cleanses, regulates and indicates the controlled pressure.

This device is located at each spraying station within convenient reach of the operator. The accumulation of moisture and oil removed from the air is gathered in a condenser equipped with an automatic drain. Control of pressures is dependent upon its efficient performance and consequently should be kept clean and in repair.

Air Compressor

With air so essential to the efficient operation of finishing departments, the air compressing equipment should be closely scrutinized. Too often it is the cause of poor finishes obtained. Compressors too small to maintain pressure under a plant's load conditions may cause fluctuations in pressures at the spraying stations, making maintenance of controlled pressure conditions impossible. Rejects are the result. Air plants should be of a capacity to maintain at all times a pressure 10 to 20 pounds above the maximum required at the highest pressure-using spray station. Many finishing departments have installed an air plant for their sole supply and thus divorced themselves from the regular plant supply so likely to fluctu-

ate in its delivery. Air supply lines too are a cause of trouble. They should always be of ample diameter to permit cool air reaching the spray booths. The cooler the air the freer it is of oil and moisture. Air supply lines are often too small in diameter but never too large.

Conclusion

With all the proper and best equipment, results are still dependent on the ability of the man behind the gun. There is a proper technique to spraying. This and other finishing room controls will be discussed in next month's article.

Keep-in-step with your best customers. More than half of all the income in the country is received by people living in seven states-New York, Pennsylvania, Ohio, Illinois, Michigan, Texas and California. People in these seven states are receiving more income than those in the forty-one states and the District of Columbia combined.

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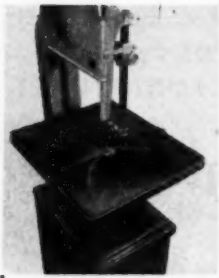

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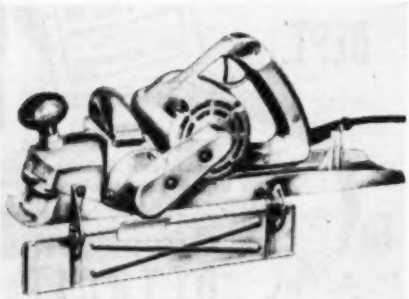
Division of St. Paul Foundry & Mfg. Co.
11-3C FAIRFIELD, IOWA

PORTABLE ELECTRIC PLANE

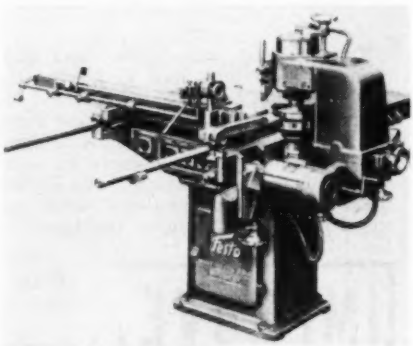
A new portable electric plane, efficient on both flat surface and edge planing, has been introduced by the Skil Corporation, 5033 Elston Ave., Chicago 30, Illinois. The new model 190 is the first plane manufactured by the company.



Model 190 has a full 3" width of cut and a depth of cut capacity of ⅛". A convenient lever controls the depth of cut with accurate graduations at each 1/64". The special chip deflector keeps work area free of chips and may be directed to right or left as desired. The cutter head travels at an ultra high speed of 13,500 r.p.m., producing a smooth, ripple-free surface that normally requires no sanding.

FESTO TENONER

Festo Woodworking Machines, 745 Fifty-first St., Brooklyn 20, N. Y., is using a new principle in combining the tenoning and coping head into one unit, we are told. This simple construction



helps in maintaining quick setups. The machine can be used for custom work as well as for high production.

The machine is also available with an independently operating check-rail slotter. The tenoner is of the heavy duty type, cutting tenons with copes up to 9" in a single stroke.

Lawyer: "Now make it brief and to the point—how did the explosion occur?" Witness: "The engineer was full, and the boiler was empty."

Don't keep telling your bride-to-be that you're unworthy of her. Let it be a surprise.

N.A.H.B. PLANS CONFERENCE

The 1953 convention and exposition of the National Association of Home Builders will be held in Chicago, January 18-22 at the Conrad Hilton Hotel.

More than 250 leading manufacturers of building materials and home equipment will display their products. Convention sessions, covering all current housing issues and the latest developments in construction methods, are expected to attract unprecedented interest among the builders. Of particular significance is the fact that this convention will be in progress at the time the new president is inaugurated in Washington.

PLANT MAINTENANCE CONFERENCE

Cleveland, Ohio will be the site of the Plant Maintenance Conference to be held there at the Public Auditorium, January 19-22. The program is planned to answer questions of all kinds. Eight sectional conferences and twenty-one roundtables will be held over the two-day period. Eleven major industries will have sessions of their own. Conferences will also be divided according to plant size. Advance registration should be made to Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

SKIL CORPORATION

Skil Corporation is the new name of Skilsaw, Inc., Chicago manufacturer of portable electric and pneumatic tools. The change has been effective for several weeks.

In announcing the change, company president Bolton Sullivan explained that the firm had outgrown the name. During their 28 years, the Skil product line has expanded from one portable electric saw to over 150 different kinds of tools. This enormous expansion had left the name "Skilsaw" limited in its descriptive value.

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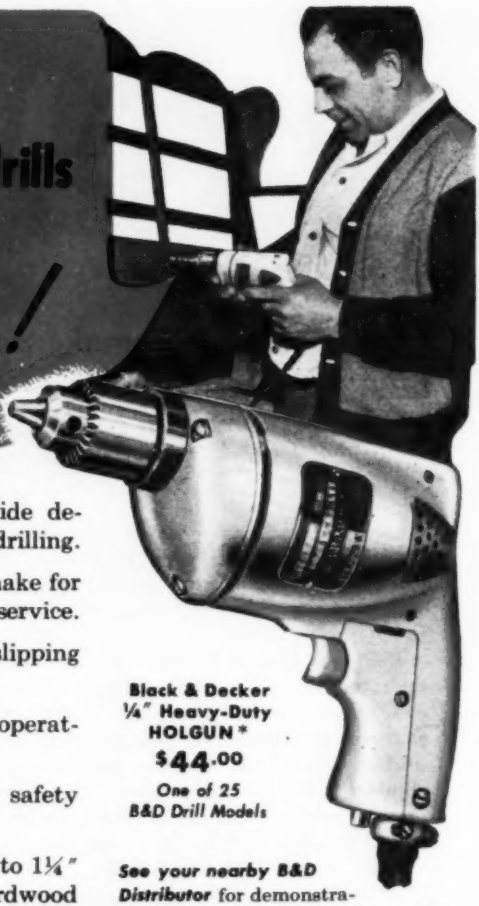

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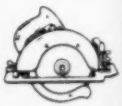

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Vacuum-Impregnation Technique IMPROVES QUALITY

By Thomas A. Dickinson

THE advantages of wood and plywood products impregnated with various resinous or plastic materials have been well-known for many years. For example, impregnated wood propellers have long been preferred in the manufacture of light airplanes because of their high strength, lack of weight, dimensional stability, resistance to warpage, etc.

But previously the processing required to obtain impregnated wood products and parts was so tedious and costly that virtually all woodworkers were inclined to avoid the use of impregnants whenever possible.

Now, thanks to a new vacuum-impregnation technique that is currently being used in the western aircraft industry, it seems more than likely that the quality of many wood products can be greatly improved without parallel sacrifices in terms of production costs.

Purpose of the new process is to increase the wetting action of an impregnant by removing particles of air that normally clog the pores of wood materials, thus making it difficult for the pores to absorb the components of a solution. Incidentally, it is retarded wetting action due to air-clogged pores that enables a piece of wood to float on water for days and weeks; and, conversely, it is water impregnation that can eventually cause the same piece of wood to gain weight and sink.

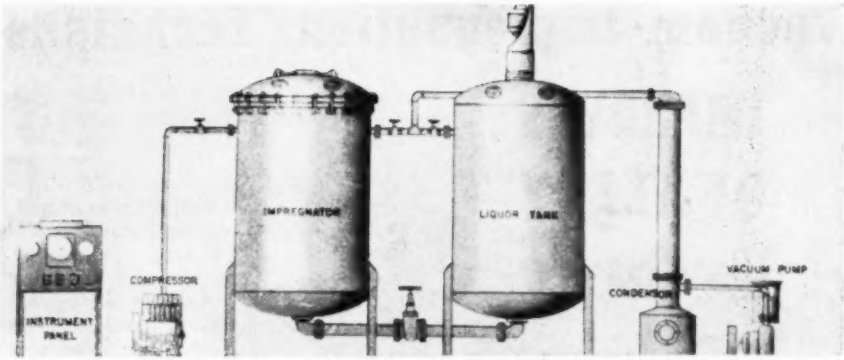
Air-clogged wood pores will not absorb resinous impregnants as readily as they absorb water, because resins comprise relatively-large molecules—particles almost as big as the pores themselves. But, when air is removed, the resinous particles have a tendency to enter wood pores much the same as dust particles have a tendency to enter the nozzle of a vacuum cleaner.

Thus, vacuum impregnation consists primarily of placing wood materials in an airtight chamber, evacuating air from the chamber, and submerging the materials in a liquid impregnant.

When the materials are completely submerged, there is, of course, no opportunity for air to reenter the wood pores. So then the vacuum can be released and compressed air pressure can be built up on the impregnant to accelerate the latter's penetrating action still further. This normally reduces the complete impregnation cycle to a period of one hour or less, after which the impregnated wood materials must usually be drained to remove excess liquids prior to the heat solidification of impregnants within the wood pores.

Wood materials are usually sawed, shaped, planed and otherwise fabricated prior to impregnation. However, impregnated wood can be satisfactorily machined where it is not necessary for an impregnant to serve a secondary purpose as a finish coating.

Cellulose and vinyl lacquers are probably the best general purpose impregnants for wood because they can be utilized with comparative speed



Schematic details of a typical vacuum impregnation unit.

and ease. However, thermosets such as phenol-formaldehyde and polyester resins are most desirable where finished products should have maximum heat resistance, chemical inertness, mechanical strength, etc.

In general, both thermosetting and thermoplastic impregnants for wood are chemically the same as the organic coatings and adhesives used in laminating and finishing plywood.

Steel pressure tanks are ordinarily used as impregnation chambers, and their dimensions naturally depend on the sizes of the articles that must be impregnated simultaneously in order to maintain a predetermined level of production. Materials or parts are arranged in the tanks so that the greatest surface area of each will be exposed to the impregnant.

Chamber pressures of 27" to 29" Hg. can be used for most impregnation purposes, and these can be built up and maintained with virtually all existent types of vacuum pumps. However, high vacuum pumps (capable of reducing pressures to almost 30" Hg., a perfect vacuum) are desirable where the more viscous impregnants should be utilized.

Impregnants are ordinarily stored in tanks adjacent to the impregnation chambers, and in most circumstances the tanks and chambers are respectively connected by pipes and valves so that the solution in a given tank will enter a vacuum chamber when a suitable valve is actuated.

As a rule, vacuum pressure is maintained in a chamber for about 10 minutes before an impregnant is used to submerge the parts therein. Then the vacuum pump is turned off before the valve for the impregnant storage tank is operated.

The quantity of impregnant allowed to enter the vacuum chamber is usually sufficient to submerge the uppermost wood surfaces to a depth of at least 6". Then, because the entry of the impregnant increases chamber pressure, the vacuum pump is again turned on so that minimum pressure can be maintained for a soaking interval of about 15 minutes.

Next, the vacuum is released, and compressed air is pumped into the upper portion of the vacuum chamber so

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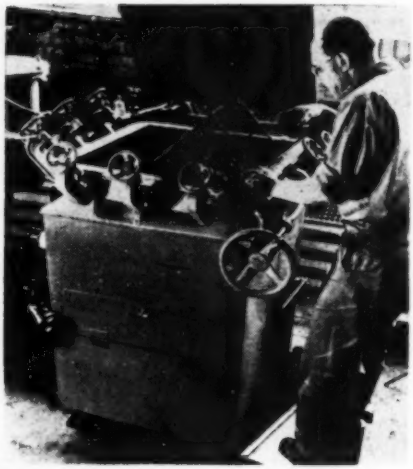


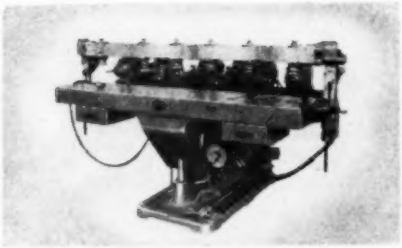
Small parts, loaded in a wire basket, are lowered into a vacuum impregnation chamber.

that pressures of 45 to 100 p.s.i. will be exerted on the impregnant for 20 to 30 minutes. Then the storage tank valve is turned, so that the air pressure will force excess quantities of impregnant to return to the storage tank.

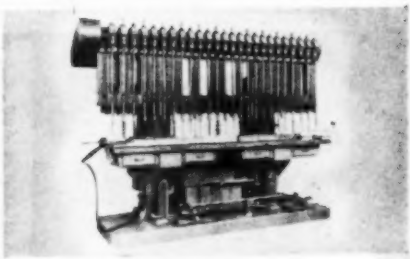
When removed from the impregnation chamber, wood materials and parts are allowed to drain thoroughly. Then the impregnated articles are baked in a standard finishing oven for two or more hours (at about 150° to 250° F.) to solidify the impregnants.

If parts are not adequately drained, or if too much heat is used in curing the impregnants, resinous exudations will appear on the wood surfaces. These can be removed with a clean rag, if the surfaces are inspected prior to the solidification of the impregnants. Surfaces with hardened exudations must be scraped, sanded and refinished if a good appearance is required.

Wood parts are usually assembled after they are impregnated, because



STYLE D-200



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A Few of our 33 Different Wood Boring Machines . . .

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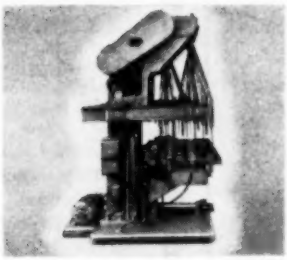

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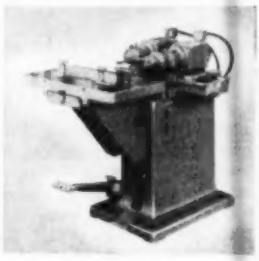

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ROOT machines are used for all types of single and multiple spindle boring. A few representative models from our extensive line are shown above. If you do not see a machine for your needs, write for our catalog.

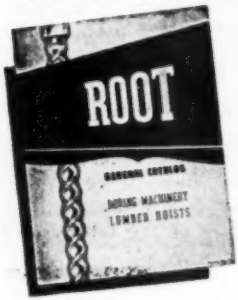
Style CCH is a large multiple spindle hydraulic feed machine for boring as many as 44 holes at one time in stock 12 feet long. A labor-saving machine for makers of agricultural implements, ladders, and other work requiring long stock.

Style D-200 is a highly developed machine for diversified boring found in furniture factories. Hydraulic spindle feed, geared-head individually motorized spindles, and automatic adjustable work clamps are a few of the features found on this widely used machine.

Style CXH is a flexible machine with universally adjustable spindles and stepless hydraulic feed. It has a 22" crossline spindle adjustment and a 4 to 6-foot boring length. Holes in a straight line or irregularly spaced patterns can be bored productively with a high degree of accuracy.

Style D-150 Radial Borer is a foot and hand-feed machine with more capacity than existing two spindle machines. Twenty-four-inch spindle-spread geared-head motorized spindles that are fully adjustable are a few of the many features of this borer. A perfect machine for the shop that does not need automatic power-feed machine equipment.

Style G-250 Boring and Mortising Machine is a foot feed machine of the general utility type. Powerful 3 h.p. 2 speed motor for large hole boring and mortising. Other features include table with universal tilt, two leverage points for light and heavy boring, totally enclosed motor, chip blower, spindle in head construction. Mortising chisel interchangeable with boring chuck. Many other features described in free bulletin on this machine.



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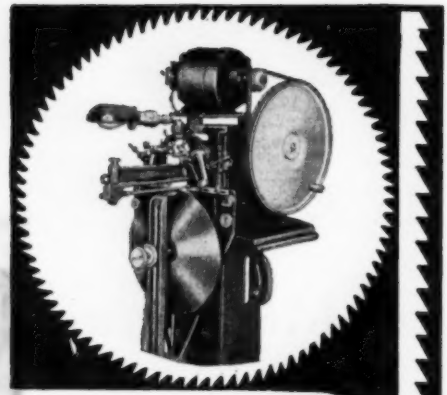

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General view of vacuum-impregnation equipment now used by Northrop Aircraft, Inc.

assembly joints could prevent the satisfactory exposure of wood surfaces to an impregnant. However, the impregnated parts do not have to be cured prior to assembly.

For instance, in the production of waterproof laminates for boats, wood veneers impregnated with phenolic adhesives can be assembled so that they will be individually cured and collectively bonded by means of a single heating operation.

Where the vacuum impregnation process is employed, finished wood products usually cost 10% to 25% more than the same products without impregnants. This is not an excessive price to pay where there is a definite need for improved wood products, because it can be offset by savings in other respects. For example:

(a) Where glass-fabric laminates would normally be used as marproof table tops, impregnated wood laminates can reduce raw material costs by a margin of at least 50% without a sacrifice in the quality of the tabletops. In

fact, the wood tabletops would have a better appearance for many applications.

(b) Where stainless steel tubing is now being employed in the fabrication of certain furniture components, impregnated wood parts would have adequate strength, a substantially lower material cost, and less weight. The latter item is especially significant because it indicates a considerable reduction in handling and shipping costs.

(c) If properly impregnated, the cheapest grades of wood can serve the same purposes as the most expensive hardwoods—thus reducing both material and fabrication costs.

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NEW FEATURES

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B. Solenoid trip permits operator to trip machine at any position desired.

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Safety SECTION

EYE SAFETY in Woodworking

By Stanley C. Herbine

THE National Safety Council estimates the annual cost of eye accidents in the United States to be somewhere around $200,000,000. These figures are derived from the fact that 105,000 disabling eye injuries occurred during the year 1951, with an estimated average compensation paid for an eye injury of approximately $500. In addition to this, hidden costs—physicians' fees, court costs, cost of incompensable lost time, noncompensable cases, etc. — are four times the amount paid in compensation.

The proportion of eye accidents in the woodworking industry to total industrial eye accidents is not available, but it is known that the industrial average for disabling eye injuries is 0.67 per million man-hours worked, and that the lumbering industry has a frequency rate of 2.35 — almost four times higher than the national average ratio of 0.67.

No one doubts that there is a real need for the use of eye safety equipment in the woodworking and lumbering industries. The problem is not whether an eye safety program is needed, but what equipment is needed, when to wear it and why. Unless workers are impressed with the why, the safety program fails.

Figure 1.

What to Wear

The chief eye hazards in woodworking are in cutting wood stock, where knots might fly out during sawing. Also, in wood turning operations, it sometimes happens that the piece being turned flies out of the lathe and strikes the operator. Other hazards are flying sawdust and splinters, and flying bits of metal during tool sharpening.

For these hazards three types of plastic shields are recommended. (See Figure 1.) Where frontal protection

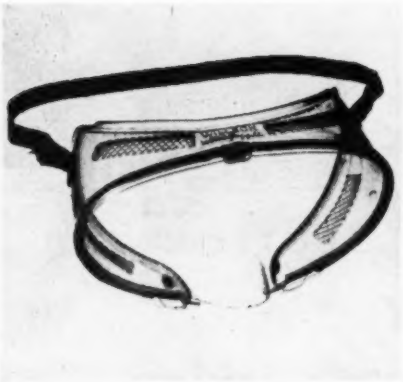

Figure 2.

only is needed, plastic safety spectacles, with wide-vision one-piece lens, afford ample security. These are light in weight and may be worn all day, even over prescription glasses, in ease and comfort. They are used on jobs that do not call for heavy duty goggles, but where some eye protection is necessary.

For protection from frontal and sidewise impact, there is a one-piece plastic lens set in a deep plastic frame, fitting the face closely around the eyes and across the forehead. (See Figure 2.) Where side vision is essential, a transparent semi-rigid acetate frame is available; where side vision is not essential, a mottled brown, opaque, polythene frame can be used. A new model has a clear acetate ventilated frame, which permits the circulation of air to reduce fogging. Tests prove that the lens resists the impact of a steel ball shot at the velocity of 225 ft. per second without penetration, and it also resists and stops the penetration by a sharp, piercing object.

For complete all-round protection, a face shield is usually recommended. (See Figure 3.) This type of equipment is used for a great variety of operations, and offers essential and adequate protection to the face and eyes. Coverage provided by this plastic visor is neither practical nor available in glass. When not in use, the visor may be raised off the face to a set position. The headgear is easily adjustable for all head sizes, and the visor comes in 4", 6" or 8" lengths according to the protection needed for the hazard involved.

The widespread use of plastic eye protectors does not mean that glass is obsolete; neither does it mean that either glass or plastics has a general superiority over the other. Each has its advantages and the use of them is governed by the hazards to which workers are exposed. Plastics are generally used in woodworking because they offer sufficient protection against the hazards involved, and are lighter and more comfortable for prolonged wear.

Figure 3.

The need for respirators in woodworking operations is usually limited to extremely dusty operations, or to paint spraying. For dust, a dust respirator provides comfortable and inexpensive protection from the hazards and discomfort of nuisance dusts. (See Figure 4.) Most dust repirators on the

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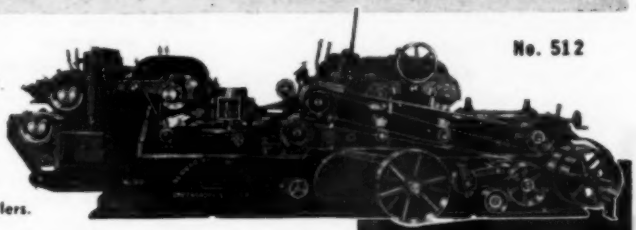

Capacity: 16" and 24" wide, 8" thick.
Speeds up to 325 feet per minute.
8" dia. cutting circle.
Six 12" dia. feed rolls.
Single and double profilers.

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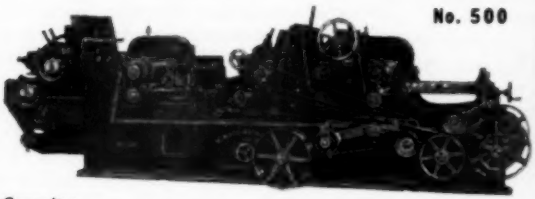

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The ball bearing NEWMAN 71 (shown below) will grind all sizes of cutter heads. Table is 33" long by 9" wide with horizontal travel of 25" and is heavily ribbed to maintain accuracy over entire travel. Maximum cutter head swing is 11".

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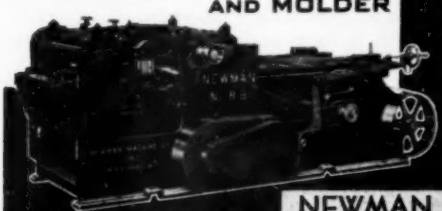
No. 8-B PLANER, MATCHER AND MOLDER



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market have comfortable molded rubber masks, adjustable to any face, and elastic headbands which assure an airtight fit. The filters are inexpensive and easy to replace, so that they can be changed frequently.

In spraying paints, varnish, or lacquers, a chemical cartridge respirator is often used to absorb the vapors or gases from solvents or thinners. With this a filter is usually recommended to absorb pigment which otherwise would clog the chemical cartridge long before its chemicals had reached a saturation point in absorbing the solvents or thinners.

Several years ago the National Safety Council surveyed its members to determine industrial practice with respect to eye protective devices. Among the industries surveyed were 7 woodworking companies and 9 lumbering companies. In these plants the following types of eye protection were used:

GOGGLES AND FACE PROTECTION WORN BY THE WOODWORKING AND LUMBERING INDUSTRIES

	Woodworking (No. of Companies) —7	Lumbering (No. of Companies) —9
Hardened Glass Lens		
Spectacles without sideshields	3	5
Spectacles with sideshields	4	5
Goggles over spectacles	4	2
Cup direct ventilation	1	5
Cup indirect ventilation	0	2
Filter lens—welders—burners	3	5
Filter lens-glare	0	2
Flat type lens	0	3
Curved type lens	0	5
Others	0	0
Not stated	1	1
Plastic Face and Eye Protection		
Plastic lens goggles	1	2
"Short" face shields	4	6
"Long" face shields	4	3
Tinted face shields	0	0
Others	0	1
Not stated	1	2
Other Types of Equipment		
Wire screen goggles	0	0
Wire screen masks	0	1
Rubber masks	0	0
Hand shields	0	1
Welding helmets	3	7
Others	0	2
Not stated	4	2

When to Wear Eye Safety Equipment

Eye injuries may be caused in so many different ways that it is difficult to say that the worker is ever safe without goggles. Goggles have prevented numerous eye accidents on many operations considered safe, and they could have prevented many others if used on more dangerous operations. They should always be used whenever there is the slightest possibility that an eye accident may occur. Nowadays eye protection is made with many comfort features which permit constant wear without disturbance to the worker.

Some companies feel that no one can determine when he will or will not need goggles. They make it a rule that goggles must be worn at all times — even by visitors to the plant.

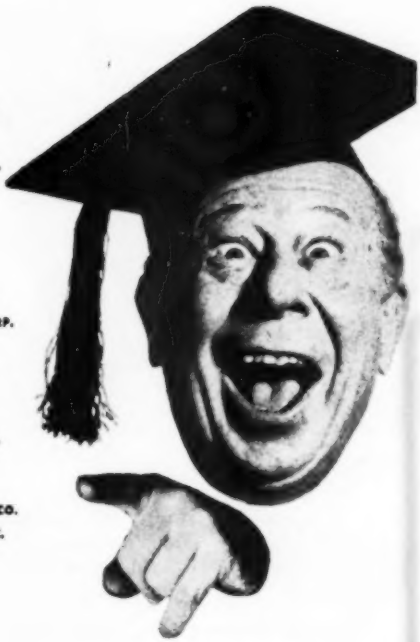
Getting Acceptance for Goggles

Getting acceptance for goggles is not an easy matter. Workers must understand why they should wear them in terms that have emotional meaning. It's so easy to take a chance, so much trouble to put on glasses, particularly if the day is hot and humid.

Plants that have put in the universal goggle rule, and have been successful in its application, say that it takes several years and a lot of persuasion and some discipline. Persuasive persistence seems to bring the best results. Discipline alone is not successful; neither is education alone. The combina-

Q.

Which of these 23 firms can reduce your costs—increase your sales?



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PHEOLL MFG. CO. • ROCKFORD SCREW PRODUCTS CO.
SCOVILL MFG. CO. • SHAKEPROOF INC.
SOUTHERN SCREW COMPANY • THE SOUTHINGTON HDWE. MFG. CO.
STERLING BOLT CO. • STRONGHOLD SCREW PRODUCTS, INC.
WALES-BEECH CORP.

PERFECTLY MATED! Only Phillips Drivers are perfectly mated to Phillips Screws. Look for the name Phillips on the shank.

A. *All of them . . . because all of them make Phillips Cross-Recessed-Head Screws*

Your customers recognize these nationally advertised fasteners as the clue to quality. Millions of readers of The SATURDAY EVENING POST are being constantly reminded that "X marks the spot." So, they're looking for Phillips Screws on the products they buy. That means extra sales for you.

And that's not all. You save time, work, and money with Phillips Wood, Machine, Tapping Screws or "Sems." They save up to 50% driving time, set up tighter, reduce damage due to slippage. Use them more . . . and get more sales.

X marks the spot . . . the mark of extra quality

PHILLIPS *Cross-Recessed-Head* SCREWS

As Advertised in POST

THE FASTENERS OF TODAY . . . AND OF THE FUTURE

Figure 4.

tion is essential. There are several steps which the safety director or supervisor can take to build acceptance for goggles:

1. Let the workers help decide what type of goggles they should wear. But let them do so with full information on the virtues of each type for its particular hazard. Safety equipment manufacturers have representatives well-trained in proper goggle selection for specific hazards, and it is often desirable to call them into a safety meeting to show which goggle types are most effective. Then there is no danger of choosing inadequate protection.

2. Tack cards and flyers on bulletin boards, and change them often enough to attract the workers' attention. To help in this effort, companies such as Willson Products, Reading, Pa., have prepared bulletin board posters with an emotional appeal. They are proving very effective, and are being used in more than 100,000 U.S. plants and in many industries abroad. Latest in the Willson series shows twin pictures of two men — one following a bird dog with gun in hand, the other following a "seeing eye" dog with cane in hand. The caption reads, "Which dog would YOU rather follow?"

3. Offer incentives to overcome carelessness. Provide some prize for a specified number of days without lost-time operation. Some article of safety clothing could be the prize. Safety shoes are awarded by one company.

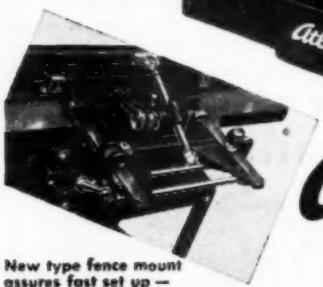
4. Put the program on an emotional basis. If workmen could realize what eye accidents cost them in lowered earning capacity, they might be more careful. The strong language of dollars and cents usually makes an impression. In most states, maximum compensation for the loss of one eye is about $2,000, and the compensation for two eyes is only $6,000 - $7,400. That's not much to live on after the eye is lost, and earning capacity is reduced. At the very least, most workmen are risking a 33-1/3% cut in salary for the rest of their lives every time they risk an eye injury.

5. See that the goggles are comfortable. Complaints like, "I can't see as well with the glasses as I can without them," "The glasses hurt my nose and ears," "These goggles are too hot," "The sweat runs down my goggles and I can't see through them," can be reduced or entirely eliminated if the safety equipment is selected with due care for the wearer's comfort, and is kept in first-class condition. Fortunately, it is not hard to find comfortable goggles for almost everyone. Safety goggle manufacturers are constantly trying to make equipment more and more comfortable and spectacles and goggles are now available in a wide range of bridge and nose sizes to fit all types of faces.

As new materials come on the market, they are tested and used for improving goggles. New plastics, light in weight and comfortable, give sufficient protec-

NOW BETTER THAN EVER

For NEW SPEED and ACCURACY in Joining Work



New type fence mount assures fast set up — greater rigidity and accuracy.

Cutter head removes for sharpening blades without disturbing their setting.

Atlas 6" Jointer

The *extra* features of this new Atlas jointer-planer save real time and money in every joining operation. Tables and fence are close tolerance ground to a mirror-smooth finish. The table surface has guaranteed alignment of .005" over-all! The new Atlas 32" x 4½" fence (bigger than many 6" jointer tables) is *triple-supported*, absolutely rigid, easy to position. Add Atlas *simultaneous blade height control, removable cutter head, and width-of-rabbet scale*, and you see why Atlas is today's outstanding jointer value. Send for catalog.

ATLAS PRESS COMPANY
1227 N. PITCHER ST., KALAMAZOO, MICHIGAN

Atlas DEPENDABLE QUALITY TOOLS SINCE 1911

tion for many semi-hazardous jobs. Ventilation ports in many models keep glasses from steaming or fogging and make it as easy to see with goggles as without them.

6. Keep the glasses clean. To keep goggles comfortable, they should be regularly reconditioned, washed and sterilized. Sometimes this is done in a central supply department, but for day-to-day use, the supervisor or safety director should see that the men care for their glasses themselves. Cleaners are now on the market made especially for cleaning and preserving plastic lenses. If equipment is issued from one man to another, it should always be sterilized between wearers.

A workable safety program does not just happen! It demands constant vigilance on the part of workers, foremen, safety directors, and management. Its costs are small in terms of protective equipment, but large in the more intangible terms of proper attitudes, attention, and care. Where these are not developed or observed, management faces large compensation costs; and the worker faces temporary or permanent disability, heartache, and perhaps reduced earning capacity forever.

1"Accident Facts," National Safety Council, Chicago, 1948.
2Roche, John M. and Kuhn, Hedwig S., "How Industry Protects the Worker's Eye," National Safety Council, "Safety Reprint General No. 2."
3"Safe Practices Pamphlet No. 14," National Safety Council, Chicago, 1940.

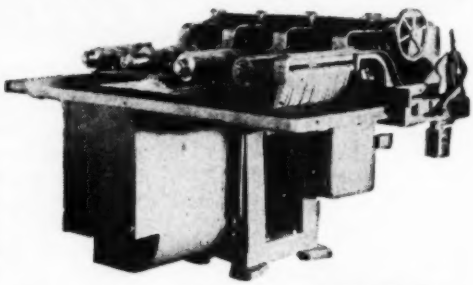
Mr. Herbine is with Willson Products, Inc., Reading, Pa.

The End

Bumper crop of babies has caught up with us. The 5-year-olds have swelled the elementary school enrollment by 1.7 million, bringing it up to about 26 million in all.

A Real Husky

No. 213 A MODERNIZED HOOSIER SELF FEED RIP SAW



SAW DUST DRUM IS OPTIONAL

DESIGNED FOR THE TOUGHEST RIPPING JOBS

FOR QUICK OPERATION — DEPENDABLE PERFORMANCE

This sturdy unit is designed specifically for high speed ripping of stock longer than 24" and as a gang ripper for stock as short as 12". The No. 213 is equipped with a stationary table top having all feed works brackets bolted to the top—as is the gear reduction drive. The mandrel rides on ball bearings and is raised and lowered quickly by a hydraulic cylinder. Eight driven rolls feed the stock through the saw at high speed. A 50 H.P. motor drives this unit at full capacity. The No. 213 is a real workhorse, built to handle your toughest jobs. Available for direct motor or V belt drive.

SINKER-DAVIS CO.

230-250 SOUTH MISSOURI ST. DEPT. 0

INDIANAPOLIS, INDIANA

Onsrud®

ROUTING • SHAPING

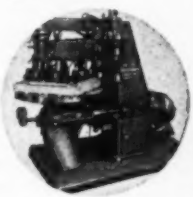
MACHINES *cut costs–too!*

Versatile as they are in production routing or shaping, Onsrud high speed woodworking machines do an equally good job on cutting your production costs.

That's because they're designed and built by men who know and appreciate the problems you face in your regular production. Onsrud machines handle special or straight work with equal ease . . . cut faster, give longer service, year after year.

W-180 MEDIUM DUTY ROUTER

W-244 HEAVY DUTY ROUTER



WA-50 AUTOMATIC SHAPER

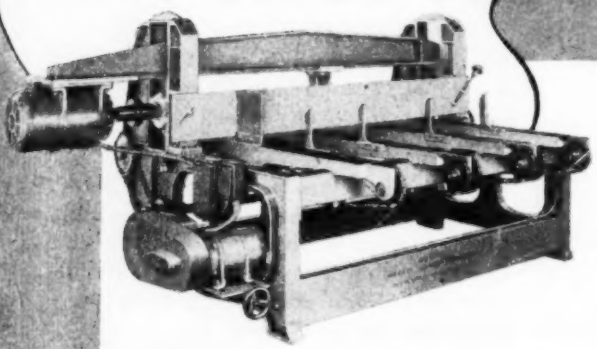
We'll be glad to send you free literature on all Onsrud high speed woodworking machines, as well as delivery information on particular models. Write or call today.

ONSRUD MACHINE WORKS, INC.

3947 PALMER STREET • CHICAGO 47, ILLINOIS

MEREEN-JOHNSON

No. 435 MULTIPLE CUT OFF SAW EQUALIZER AND GROOVER



Versatile is the name for this No. 435 machine. Not only will the standard unit perform any multiple cutting, grooving or equalizing job—but it will simultaneously perform any combination of them.

Other important facts about this No. 435 machine include, extreme accuracy of performance, large capacity, ease of adjustment and rugged construction.

Whether you are manufacturing sash and doors, furniture, cabinets, refrigerators, or any of a dozen other items: REMEMBER the No. 435 Multiple Cut-Off Saw, Equalizer and Groover will do many jobs to your utmost satisfaction.

If you have a special problem our engineers, trained for the purpose, will help you work out the combination best suited to your needs.

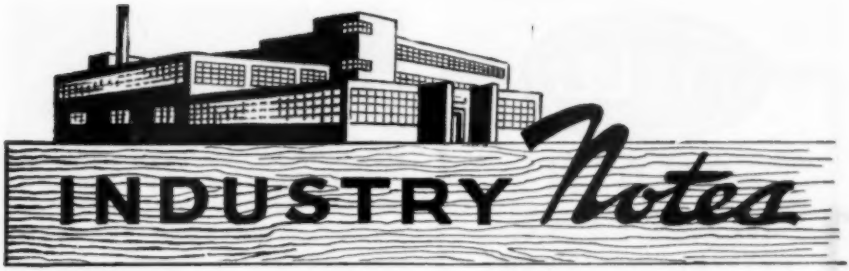
WRITE FOR FREE, ILLUSTRATED FOLDER

M&J

Mereen-Johnson . . .

MACHINE COMPANY

MINNEAPOLIS, MINNESOTA



NATIONAL STARCH OPENS LABORATORY

The opening of National Starch's Alexander Research Laboratory, Plainfield, N. J., marks the latest step in the company's two million dollar resin expansion program. From a small adhesives plant in New York City, the company has expanded to four plants

in the United States, two in Canada, one in England and one in Holland. The laboratory has been named after Alexander Alexander, founder of the company in 1895.

CARBIDE TOOL SCHOOL

The first specialized school in the use of carbide tools in the woodworking industry has been established in the Carboloy Department of the General Electric Company plant, Detroit. Fifteen individuals from the U. S., Canada and Norway attended the five-day classes. This was the first of many which Carboloy has scheduled to acquaint the industry with the applications of its carbides.

The schedule of class work included: films, plant tours, discussions, demonstrations, practical grinding practice and several field trips.

The second class was scheduled to begin October 27. Other classes will be held in the near future.

COE SALES MEETING

The Coe Manufacturing Company of Painesville, Ohio, manufacturers of veneer machinery, held a sales meeting at their office. We are taking this opportunity to introduce some of their men to WOOD WORKING DIGEST readers.

Pictured, from left to right, is E. P. Morris, sales manager; Howard Price,

FIELD
SINCE 1886

CHAIN MORTISE
CUTTING EQUIPMENT

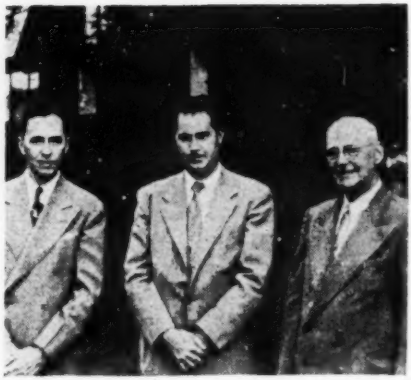
A TOOL ROOM Product

By A Tool Room Expert!

Use our double bearing guide bars for flat bottom mortises. The riveted plate and bearing construction provides the utmost in strength and interchangeability. More than 90 standard sizes in the FIELD line of cutting equipment. We are well-equipped to furnish special sizes like the above bar in many widths and lengths.

Write for complete information on our chain mortising equipment.

WILLIAM H. FIELD CO.
327 Dorchester Ave • Boston, Mass.



High Point, N. C., southeastern sales engineer, and A. M. Conway of Portland, Oregon, manager of West Coast Operations. Other men present but not pictured were N. C. Oehling of Jackson, Miss., central southern sales representative, and A. S. Holden, executive engineer of Painesville, Ohio.

Appointments

Conde Hamlin, formerly assistant to the director of sales of American Machine & Foundry Company's General Products Group, has been named general sales manager of DeWalt, Inc., Lancaster, Pa.

R. H. Morris **Conde Hamlin**

R. H. Morris, formerly publisher of "American Builder Magazine," has been

appointed general manager of Ponderosa Pine Woodwork. Mr. Morris has wide experience with the building industry.

Ekstrom, Carlson & Co., Rockford, Ill., has announced two new appointments. **Vernon Satterthwaite** has joined the staff of the Tool Division and will devote all of his time to the promotion of sales and distribution of the company's cutterheads, all types of knives, bits, form cutters and milled to pattern bits. **J. S. ("Jim") Tompkins**, formerly consulting engineer for the Wisconsin Knife Works, has joined the staff as sales engineer in the Cutting Tool Division.

J. S. ("Jim") Tompkins

Vernon Satterthwaite

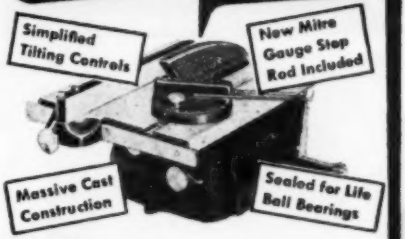
At the annual meeting of the board of directors of the Bell Machine Company, Oshkosh, Wis., **E. J. Bell, Jr.**, formerly secretary and treasurer, was elected to the office of president of the corporation, succeeding M. A. Bell, who had served as president for the past 14 years.

The Continental Screw Company, New Bedford, Mass., has assigned **Dean B. Skillin** as sales representative in the states of Delaware, Maryland, Penn-

Frank M. Hart

Dean B. Skillin

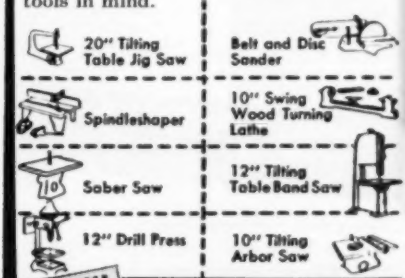
SHOPMASTER QUALITY TOOLS ARE TODAY'S BEST WOODWORK SHOP BUYS!


Simplified Tilting Controls
New Miter Gauge Stop Rod Included
Massive Cast Construction
Sealed for Life Ball Bearings

SHOPMASTER

8" TILTING ARBOR SAW 49.95

Shopmaster Tools are priced as low or lower than any other power tools on the market today . . . give you more outstanding precision features for a lifetime of accurate, dependable shop service. You'll appreciate their extra heavy, rugged construction, fine precision bearings, simplified operation, and exceptional versatility. Whether your shop is large or small . . . there's a Shopmaster Power Tool to fit every requirement. When you make up your equipment requisitions this year . . . be sure to keep low cost . . . high performance Shopmaster recognized quality tools in mind.



FREE catalog of famous quality Shopmaster tools and accessories . . . Write Shopmaster, Dept. WD-11, 1214 Third Street South, Minneapolis, Minnesota

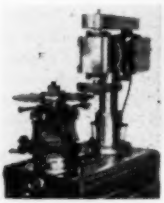
NEW ROGERS "NT JUNIOR" KNIFE GRINDER

WITH REVERSING MOTOR DRIVE

Here's new, fast electrically controlled grinding for all woodworking straight knives.

Reversing motor drive . . . "V" way table bearing surfaces . . . knife bar with 2 faces for thick and thin knives . . . and many other Rogers features give **precision work and long life.**

Four sizes,—32", 38", 48" and 60". Also 66" for Veneer, hog and light chipper knives. Large grinders available. Check coupon below.



CARBIDE SAW GRINDER TYPE SC-1

Double purpose grinder . . . handles carbide circular saws or sideheads. Easy to operate, - accurate. Save money in your own plant . . . write for bulletin SC-1.

SAMUEL C. ROGERS & CO.

209 DUTTON AVE. BUFFALO 11, N. Y.

SINCE 1887

Please send further information

( ) NT Junior ( ) Type SC-1

Company.....

Address.....

City.....Zone.....State.....

Attention of.....

sylvania, District of Columbia and the lower part of New Jersey. **Frank M. Hart** is representing the firm in Indiana, Wisconsin and upper Michigan.

The Georgia Pacific Plywood Company has named **Graham Rohrer** as specialty sales and advertising director. Mr. Rohrer will also be responsible for

Donald S. Macintyre

Graham Rohrer

the development of new products. This same company also announces the appointment of **Donald S. Macintyre** as treasurer and controller.

Commander Manufacturing Company, 4225 W. Kinzie St., Chicago, has appointed **Richard M. Tuthill** as its district factory representative.

The Carborundum Company has announced a number of appointments. **Ernest S. Kopecki** has joined the Public Relations Department; **Harry C. Martin,** director of research and development, has been elected a vice-president; **William J. Kingsley** is now the new assistant general sales manager of the company.

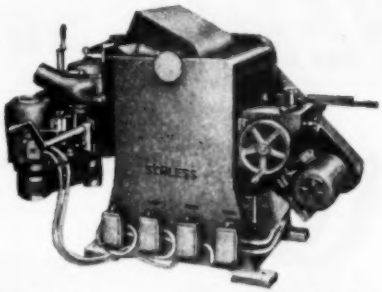
W. E. DIFFORD

West Coast plywood manufacturers have named W. E. Difford of Seattle as managing director of their industry trade association. This is the second time that Difford has been called upon to direct trade promotion for the important northwest forest products industry which today is comprised of 85 factories employing 20,000 workers.

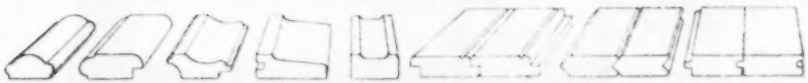
3 SIDE PLANING MACHINES

Wherever efficient, high speed, and economical performance is required on planing operations, the Schless 3 Side Planing Machine provides the answer. Made in 2 sizes: 16" and 25". Machine illustrated is electrically operated fitted with 4 attached motors. Equipment is well built and precision work is assured. Vertical spindles can be raised or lowered while machine is in motion. Send today for free folder with full specifications.

Write now to:



Model DH-4 is now on Demonstration at Industrial Electric Motor & Tool Co., Inc., 110 Lafayette St., New York 13, N. Y.

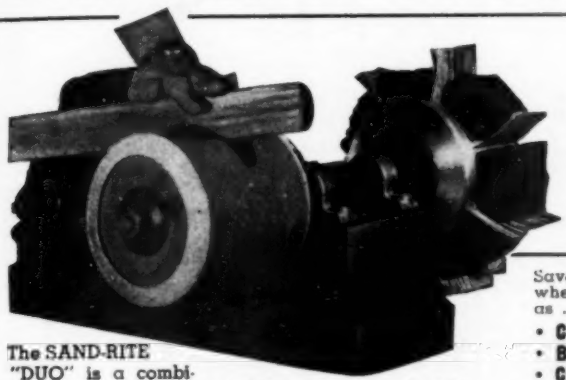


Universal Technical & Trading Co.

Sole Representative For U.S.A.

10 East 39th Street — New York 16, N. Y.

SAND CONTOUR SHAPES FASTER



USE A SAND-RITE "DUO" SANDER

The SAND-RITE "DUO" is a combination Rotary Brush and Pneumatic Drum Sander that is highly versatile for use in every shop.

Save time and materials when you sand such items as . . .

- **CHAIR LEGS & ARMS**
- **BRUSH HANDLES**
- **CHAIR SEATS**
- **GUN STOCKS**
- **FURNITURE TRIM**
- **MOULDINGS**

WRITE TODAY FOR CIRCULAR

SAND-RITE MFG. CO.

Dept. W., 226 W. Schiller St. Chicago 10, Illinois

NEW 1/4" DRILL BY PORTER-CABLE

PORTER-CABLE Guild

Feature for feature this new drill scores *highest*...

...yet costs only $28.50!

Compare

...This new Guild general-duty Drill with *any other* quarter-incher in its price range. Built into it are the results of 7 years of nationwide surveys, engineering development and field testing. Everything you drill users want in a drill is included. Compare—add up the score—you'll quickly see why you get *more* bonus features ... *more true value* for your money!

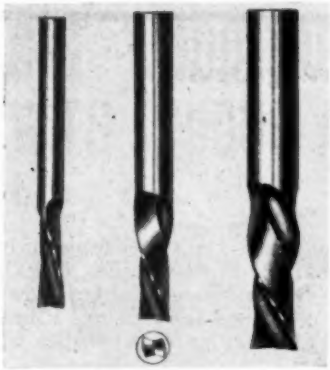
		Guild Drill	Other Drills A	B	C
1	True-centering Jacobs Multicraft Chuck	Yes	Yes	Yes	Yes
2	2200 RPM — most practical for general purpose drilling	Yes	Yes	—	—
3	Non-block Air Vents — never covered by left hand	Yes	—	Yes	
4	Low-slung housing — permits drilling within 3/8" of vertical surface	Yes	Yes	—	—
5	Trigger Lock under right thumb for instant control	Yes	—	Yes	—
6	Strain Reliever — prevents cord kinking and pulling out	Yes	Yes	Yes	Yes
7	Full Power — drills 1" bar stock in 2 min.; 1" hardwood board in 1 1/4 min.	Yes	Yes	—	—
8	Longer, more comfortable full-hand Pistol Grip	Yes	Yes	—	Yes
9	Easily accessible Quik-Change Brushes	Yes	Yes	Yes	—
10	Convenient chuck key strap included	Yes	—	—	Yes
11	Compound reduction gears	Yes	Yes	—	Yes
12	Spindle ball bearing absorbs radial and thrust load	Yes	—	—	—

GET YOUR MONEY'S WORTH!

When buying a new drill, score the Guild against *all other* 1/4" general duty drills. Comparison proves Guild is your better buy! New 1/2" Drill also available.

AT YOUR **PORTER-CABLE** DEALER'S

• Or, write for free descriptive folder with comparison chart and name of nearest dealer. PORTER-CABLE Machine Co., 5131 N. Salina St., Syracuse 8, New York. In Canada write: Strongridge, Ltd., London, Ont.



try an Onsrud double-edge down cut spiral

FOR THE SMOOTHEST ROUTING IN WOOD WORKING

Double shearing action of these double edge bits gives you easier feed. Cutting is so smooth that finish on work approaches that of sanding. Less tiring for the machine operator . . . with dependably better work obtained in every kind of wood and every type of cut.

TRIAL OFFER . . . order a dozen bits. Try one. If it's not the smoothest bit you've ever used, return the entire shipment at no cost to you. Order by Figure Number below:

FIGURE NUMBER	DIAMETER OF EDGE	LENGTH OF CUTTING EDGE	SHANK DIAMETER	PRICE EACH 1 to 12	TOTAL PRICE PER DOZEN
1-S11-D	1/4	3/4	1/4	$1.82	$21.84
2-S11-D	1/4	3/4	3/8	2.53	30.36
3-S11-D	1/4	3/4	1/2	3.25	39.00
4-S11-D	5/16	3/4	3/8	2.53	30.36
5-S11-D	5/16	3/4	1/2	3.25	39.00

Other sizes and special sizes also available, write for Catalog 53-W

ONSRUD CUTTER MANUFACTURING CO.
800 E. BROADWAY • LIBERTYVILLE, ILLINOIS
Routing and Shaping Cutters for Woodworking

New Literature

KELLY CLAMPS

A folder showing detailed drawings of the various models of Kelly clamps is available from the Robert J. Kelly Manufacturing Co., P.O. Box 61, Newport, R. I. The brochure features the balanced design, positive gripping control and one hand release for woodworking and gluing operations.

ENTERPRISE SAWMILLS

Enterprise sawmills, manufactured by the Enterprise Co., Columbiana, Ohio, are described in a new piece of literature. The Enterprise Company has been building sawmill machinery for more than 75 years. This literature describes the various component parts of their sawmills and illustrates many of them. Sawmill accessories are also described. The last page of the brochure carries a specification table showing principal dimensions for Enterprise sawmills.

For Lubricating Devices
Call On
GITS
First!

GITS Bros. covers the *entire range* of lubricating devices: Oil Hole Covers, Oil Cups, Grease Cups, Bottle Oilers, Gauges. Gravity-Feed, Wick-Feed, Constant Level, Vibrating Rod styles. Threaded or Drive-type. Elbow or Straight.

GITS Bros. offers the most complete selection of standard styles.

GITS consistent quality in design, materials and machining has made Gits Lubricating Devices the standard for industry for more than 40 years.

GITS Lubricating Devices are far-famed for solving tough oiling problems at low cost.

GITS Bros. Engineering Staff – true specialists in lubrication engineering – is at your disposal.

Write today for free illustrated Catalog No. 60-A. Use it as your handy reference for lubricating devices.

GITS BROS. MFG. CO.
1878 S. KILBOURN AVE. • CHICAGO 23, ILL.

DRILL PRESS CATALOG

A comprehensive new drill press catalog, which fully describes and illustrates the 120 models which comprise their Helmet Head and popular priced Challenger lines, has just been released by the Boice-Crane Company, 931 Central Avenue, Toledo 6, Ohio.

A certain amount of opposition is a great help to a man; kites rise against and not with the wind.

HEATING UNIT CATALOG

The Thermobloc Division of Prat-Daniel Corporation, South Norwalk, Conn., has announced issuance of a new general catalog.

The catalog, printed in two colors, features a full-color cutaway illustration of a Thermobloc direct-fired heating unit. Various models manufactured by the company are illustrated, both photographically and with line drawings. Specifications and dimensions on all models are listed.

CUT WOODWORKING COSTS WITH UNIQUE AIR CYLINDER

The Bellows electrically-controlled Air Motor is the only air cylinder made as a complete "packaged" electrically-controlled air-power unit. A single flexible hose air connection, one electrical connection, and you have fast positive air-powered action, ready to do a hundred jobs around a woodworking shop: clamp, bore, raise and lower work tables, feed saws, drills, set dowel pins, etc. Here is a power unit you just can't afford to be without.

Write for this free Book

Tells you all about how you can use the Bellows Air Motor and other Bellows "Controlled-Air-Power" Devices to get more output at less cost. Write today — Address The Bellows Co., Dept. WD-1152, Akron 9, Ohio.

The Bellows Co.

Akron 9, Ohio

1390

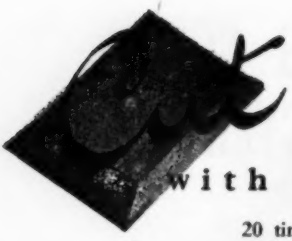
WHITNEY MACHINES

Baxter D. Whitney & Son, Inc., Winchendon, Mass., have issued a new catalog on their woodworking machinery. Illustrated are their single and double planers, belted shapers and direct motor driven electric shapers, saw benches, back knife lathes and wood scraping machines. The catalog illustrates every machine as well as several models of each. A table on the last page shows specifications for all machines and other pertinent data.

DIEHLCRAFTER

The G. M. Diehl Machine Works, Inc., precision woodworking machinery builders of Wabash, Indiana, has released the first issue of a completely new "Diehlcrafter," Diehl's magazine-type house organ.

The publication marks a distinct change in both size and format from the old publication. Now 8½" x 11", the magazine shows—through pictorial articles—the latest production methods



COSTS and DOWN TIME

with CARBIDE TOOLS

20 times or more production between grinds. This means savings in labor and in down time . . . means better quality, too. The answer to your production problems may be carbide tools . . . and for the best, it's Buelte. Typical items for which carbide tools are used include hardwood, plywood, plastics, fireproofed woods, waterproofed glued products, bakelite, and other products.

Buelte craftsmen have specialized in the production of carbide tools for many years. Therefore, they are able to devote the full time efforts of their organization to the rapidly growing developments in the use of carbide tools by the woodworking industry. Each tool is carefully designed and made from the best high quality steel. And you pay no more for Buelte quality!

Many Buelte tools are in stock for immediate shipment. Send today for informative folder and prices.

Buelte Tool & Engineering Co.

Box 17

BELVIDERE, ILLINOIS Telephone 1026

of leading precision woodworking plants throughout the country. Featured in the new issue are manufacturers of doors, moulding, plywood, veneers, bedroom and dining-room furniture.

EVERYTHING FOR WOOD FINISHING

This is the title of a catalog issued by H. Behlen & Bro., Inc., 10 Christopher St., New York 4, N. Y. Their lists contain the more important items used in the hardwood finishing trade. The firm has been in business since 1888 manufacturing and distributing materials needed in hardwood finishing. The list is in alphabetical order and ranges from abrasive paper and cloth to varnishes. A complete line of brushes is illustrated.

The 51-page catalog is well illustrated and should be of interest to all in the finishing industry.

SCREW CATALOG

A new catalog in color has just been

WOODWELDER *History of . . .*

THE MIRACULOUS RADIO FREQUENCY WOOD BONDING TOOL

- **1942-43** Research at Forest Products Laboratory in Wood Technology. Formulating Electronic Gluing Technique.
- **1943-44** Application of Radio Frequency to Invasion Glider Mfg. Origination of Edge Gluing Furniture Core.
- **1944-45** RF Application to Plywood Jettison Gas Tanks for Fighter Planes. Laminating Compound Curvatures (RF glue curing).
- **1945-46** Radio Cabinet RF Gluing Furniture Assembly.
- **1946-47** Television Cabinet Mfg. Speed Boat Assembly.
- **1947-48** Show Case and Fixtures. Sash & Door Fabrication
- **1948-49** Minesweeper Boat Assembly. Automatic Scarf Gluing (Offals).
- **1949-50** Laminated Arch Beams. Hollow Core Door Mfg.
- **1950-51** Parquet Flooring Installation. Acoustic Tile Installation
- **1951-52** Ceramic Tile Bonding. Decorative Plastic Bonding.
- **1952** Welding Lacquered and Painted Plywood plus Hardboard to Walls, Ceilings, Floors and Furniture.

Radiation Certificate attached in compliance to FCC Docket No. 7858.

WOODWELDER
Trade Mark Registered U. S. Patent Office and Foreign Countries

Jack Cunningham, inventor and developer of the Woodwelder, presents the greatest achievement in ten years of radio frequency gluing (1942 thru 1952). Prefinished plywood with high polished lacquered surface welded to frame in wall and cabinet construction. Radio frequency energy projected through finish, wood, tile, ceramics, glass and plastics to bonding resin. Minimum glue curing cycles of three seconds obtained.

Woodwelders Are In Operation Near You. — Write for Names of Users and Dealers

Woodwelding, Inc.

3000 WEST OLIVE AVE · BURBANK, CALIFORNIA

published by Southern Screw Company, Statesville, N. C., which manufactures a complete line of steel and brass wood screws, in slotted and Phillips head styles. This catalog adds many new sizes to the company's line so that they now make wood screws from 3/16" long by No. 0 diameter to 6" long by No. 30 diameter.

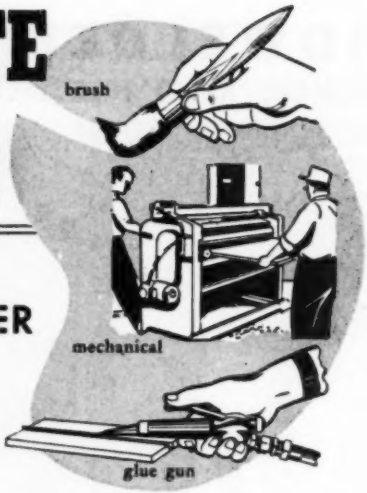
MATTISON MOULDERS

The Mattison Machine Works, Rockford, Ill., has issued a brochure on their No. 229 electric ball bearing moulder. The literature shows front and rear views of the machine; describes operation; includes a diagrammatic sketch of the exclusive features of the machine and describes them in detail.

PENCIL MACHINERY

The S.A. Woods Machine Co., Boston, Mass., have issued a brochure about their pencil machinery. Two machines

MONITE "3-day" GLUE



SPREADS UP TO
30% FARTHER
by • HAND
• MACHINE
• GLUE GUN

The CASEIN GLUE with 3-DAY POT LIFE!

MONITE "3-DAY" Casein Glue has good water resistance and great strength, 'stainsless', and remains usable 3 days or more.

SPREADS EASILY by brush, gun or mechanical glue spreader.

SPREADS up to 30% FARTHER than ordinary casein glues.

LOW pH means practical freedom from glue stain on woods such as oak.

INVESTIGATE the savings in time and material you can make with MONITE "3-Day" Casein Glue.

H. L. Prestholdt, Pres.

WRITE TODAY FOR FREE TEST SAMPLE!

TRADE MARK MONITE WATERPROOF GLUE CLUB

MONITE WATERPROOF GLUE COMPANY
1628 NORTH 2ND. MINNEAPOLIS 11, MINNESOTA

are illustrated and described in the 4-page folder. One of these is the Woods 807M-2D grooving machine. This machine has two top heads. The first head finishes the top and edges of the slat, and the second head cuts the lead grooves. With this arrangement of heads a uniform depth of groove can be maintained.

The second machine is the Woods 807M-2E shaping machine. The semi-machined pencil block is cut equally divided between the top and bottom heads on this machine.

ROUTER BIT CATALOG

The North American Products Co., 3100 W. Cherry St., Milwaukee Wis., announces the release of a new catalog illustrating and describing their carbide-tipped router bit set. These tools are designed for the finishing of laminated plastic tops for counters, bars, cabinets, etc.

Amazing DISPOSABLE *Blade*

Super-Hard Teeth

Patent Applied For

HEINEMANN'S

New HARD-TIP Saw

Throw Away When Dull

Stays Sharp 5 Times Longer

Sensational Low Price

Reduces Costs 50% to 60%

Cuts Smoother and Faster

Ends Your Saw Troubles

Remarkable . . . this new DISPOSABLE Heinemann "Hard-Tip" Blade. Short teeth, specially hardened, stay sharp many times longer — cut faster, smoother, quieter. Short teeth can't grab — safer to operate — requires less power. Always round and efficient — never develops cracks. Saws fine on any type machine, all kinds of work. The low price will astonish you — $1.77 for Standard Type "C" 6 inch. Equally low prices on all sizes up to 16 inch.

GET THE FACTS TODAY! WRITE FOR FREE BULLETIN AND NEW LOW PRICES ▶

At any one of our 3,000 Dealers in U.S.A. or write, wire, phone.

THE F. HEINEMANN SAW AND MFG. COMPANY

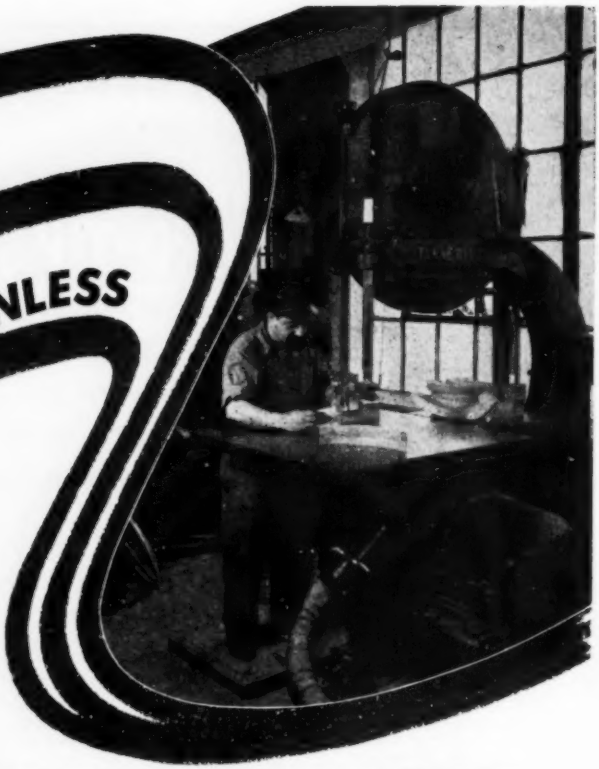
CANTON 6, OHIO

HARRY GAINES ELECTED PRESIDENT OF N.H.L.A.

Harry D. Gaines, widely known lumberman of St. Louis, Mo., was elected president of the National Hardwood Lumber Association at the 55th Annual Convention, held in Boston, September 22-25. Mr. Gaines, head of his own hardwood wholesale business, succeeds Lee Robinson, sawmill operator of Mt. Vernon, Alabama, who has served as president for the past two years. Robinson now becomes a member of the executive committee.

Re-elected to serve as vice-presidents are James C. Walsh of Chicago and T. M. Millett of Louisville, Kentucky. Franklin Griffin of Chicago, also elected to a vice-presidency, has been serving as a director for a number of years. New directors chosen to fill vacancies include Alvin Huss, Huss Lumber Co., Chicago. Joseph L. Muller, who has been serving as acting secretary-manager, has now been appointed secretary-manager.

QUIET SMOOTH VIBRATIONLESS



PROVIDING:
EFFORTLESS CUTTING – VASTLY INCREASED PRODUCTION – SMOOTHER CUTS RESULTING IN IMPORTANT REDUCTIONS IN CLEAN-UP OPERATIONS

TANNEWITZ
HIGH SPEED BAND SAWS

It's a pleasure to operate a Tannewitz High Speed Band Saw.

These machines are built with such exact precision and so thoroughly balanced that even when delivering nearly two miles of saw-blade travel per minute, they can hardly be heard. It's this superior construction, combined with numerous exclusive features of operational convenience, that makes them by far the best investment in band saws. They'll save their cost year after year in trouble-free service. They are the best by any test – the cheapest in the long run. For complete description, write for Bulletin "GH".

BUILT BY SAWING MACHINERY SPECIALISTS

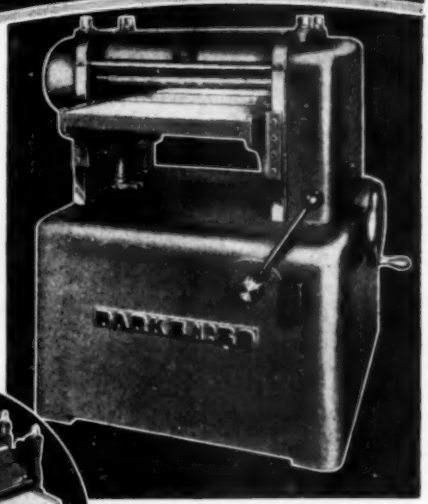
THE TANNEWITZ WORKS, Grand Rapids, Mich.

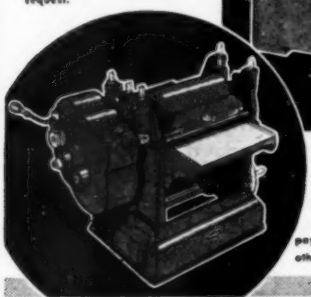
PARKS PLANERS

20" THICKNESS PLANER

The Parks No. 20

A modernly designed, low-priced, high-speed 20" x 6" planer that meets the surfacing needs of every type of woodworking shop. Ruggedly built for vibrationless operation—assuring quality work, increased production and low operating costs. Provides two feed speeds—30 and 40 F. P. M. and 40 and 80 F. P. M. Four-knife cutterhead has speed of 3600 R. P. M. Complete descriptive literature on request.





12" THICKNESS PLANER

A compact, sturdy machine that offers mill planer precision and ruggedness at a sensationally low price. A real heavy-duty 12" x 4" planer that can pay for itself in savings effected through the salvage of otherwise waste stock. Write for descriptive catalog sheet.

The **PARKS** WOODWORKING MACHINE COMPANY

Manufacturers of Quality Woodworking Machines Since 1887

DEPT. 20-J 1546 KNOWLTON STREET, CINCINNATI 25, OHIO

FIELD OPEN HOUSE

On September 8-12, 1952, the William H. Field Co. held its second annual open house for the woodworkers of New England. The display was held during the same week as the Boston Furniture Show so that manufacturers were able to conveniently attend the display while in Boston. Approximately 600 people attended. This year the William H. Field Co. had primarily production woodworking machinery on hand and in operation.

TWENTIETH ANNIVERSARY CELEBRATED

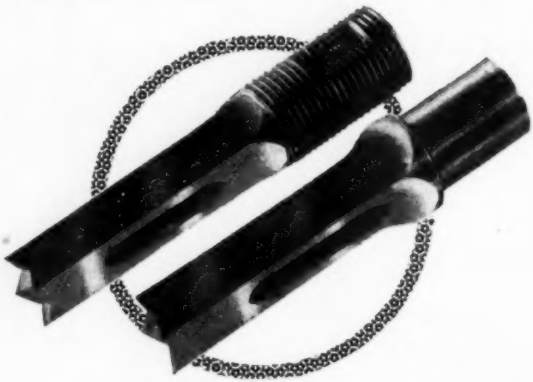
From a humble beginning in a back street loft, Auto-Nailer Company's parent company, Auto-Soler Company, of Atlanta, Ga., celebrated its 20th anniversary recently as an international producer of automatic nailing machines.

It was 20 years ago that William H. Wilkerson, the founder and now president, met with 11 stockholders who had scraped together approximately $1600

Smooth Mortising

with

Wysong & Miles HOLLOW CHISELS



For fast, accurate Mortising, specify quick cleaning, precision made, Wysong and Miles Hollow Chisels. Smooth or Threaded shank. Prompt delivery on popular sizes.

WYSONG and MILES Co

GREENSBORO, NORTH CAROLINA

DOVETAILERS • MORTISERS • SANDERS

in cash. Renting a back street loft under a candy shop for $10 per month, Mr. Wilkerson and his one employe searched automobile junk yards for bits of machinery to convert into parts for the first machine.

During the one and one-half years it required to complete the first machine for their first customer (it was an Auto-Soler, used to attach heels and soles to shoes), Mr. Wilkerson (as he puts it today) "begged, borrowed and starved" while trying to keep the little company alive. To complicate matters, someone in the candy shop on the floor above would now and then carelessly allow a pot to boil over and the sweetened goo would come pouring down and put everyone to flight, not to mention messing up parts and machines.

The company has come a far distance from those early days and now sells its Auto-Nailers and Auto-Solers throughout the United States and 36 foreign countries. The "Soler" is used in the

DON'T BE MISLED BY EXTRAVAGANT CLAIMS!

SOUTHERN

WOOD SCREWS

Slotted or Phillips Heads

have proven holding power

Single-thread Southern screws have far greater strength and holding power than any other type of screw. Actual tests by the Federal Bureau of Standards prove that single-thread screws with their full-size shanks have greater holding power.

What's more, Southern screws have sharp gimlet points that bite in and hold—not the dull, misshapen, hard-to-start points that are characteristic of other type fasteners. The thin, keen, cut threads of single-thread Southern screws contrast sharply with the crude rolled threads of other screws.

Don't be misled by extravagant claims for inferior fasteners. Stick to single-thread, precision perfect Southern screws. They meet Federal Specifications. Write today for our catalogue.

FACTORY WAREHOUSES

4100 Dell Avenue
North Bergen, N. J.

325 West Ohio Street
Chicago 10, Illinois

280 Decatur S.E.
Atlanta, Georgia

SOUTHERN SCREW COMPANY

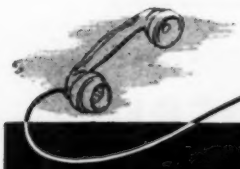
114 Rickert Street **Statesville, North Carolina**

shoe service industry, and the "Nailer" in the woodworking, toy, furniture and plastics industries. From the first small machine, which was about the size of a quart bottle and worked by hitting the top a sharp blow with the hand, the company today turns out high-precision, electrically operated Auto-Nailers and Auto-Solers which cut and drive their own nails at the rate of three per second. Many furniture and woodworking plants have large batteries of these machines for fast assembly line work.

JOHN L. EBBING

John L. Ebbing, formerly vice president of the Detroit Edge Tool Co., passed away sudenly on October 7. Mr. Ebbing had been with the Detroit Edge Tool Company in executive capacity since 1926.

The only time the average man doesn't give a pretty girl a second look is when she's standing before him on a crowded bus.



Fast, complete saw service as near as your phone —ask for ATKINS

Silver Steel®

Ask for Atkins for narrow band saws; solid tooth or inserted tooth circular saws; segmental-type smooth-end trimmers; and machine knives. Depend on *Silver Steel* for cutting, shaping, trimming, planing—and for cutting your cutting costs.

Your nearby Atkins distributor can give you fast, exacting service —emergency service if need be— to keep production lines up, to keep labor costs down. Call him now for time-saving, money-saving recommendations. Count on this one dependable source for all standard woodcutting tools.

AAA ATKINS ALWAYS AHEAD

America's Quality Line of Cutting Equipment Since 1857

Saws, machine knives, files, trimmers—for production, maintenance, all operations—for woods, metals, plastics

BW

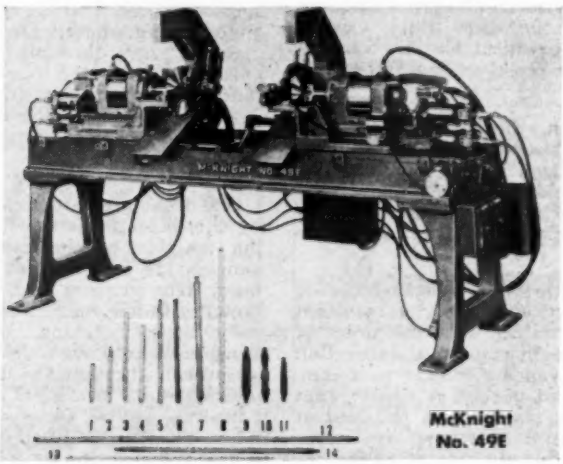
ATKINS

ATKINS SAW DIVISION • BORG-WARNER CORPORATION

INDIANAPOLIS 9, INDIANA

EQUIPMENT and Supplies for the WOODWORKING INDUSTRY

SAWING AND CHUCKING MACHINE

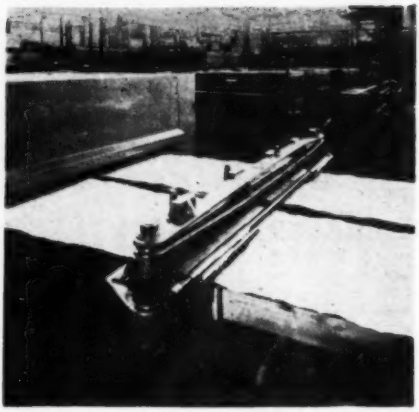


McKnight Machinery Corp., Gardner, Mass., announces a new, moderate priced, high production, automatic double end sawing and chucking machine. This versatile machine, particularly adapted for the chair and juvenile furniture industry, is designed to increase production on spindles and parts for cribs, youth beds, high chairs, play pens, clothes dryers and mop and brush handles.

Capacity of the machine is from 5½" to 48" in length and from ½" to 1½" dia. on square, rectangular or round stock. It is of modern design with air feed and direct motor driven heads for high speed production on various types of straightline double end trimming and chucking operations.

The manufacturer claims 15 to 50 pieces per minute depending on the size and regularity of the stock. The motors are actuated by air cylinders

controlled by solenoid operated valves which are governed by means of micro limit switches. An end boring adapter may be used interchangeably with the chucks for the end boring of handles and similar items. Samples of stock which may be processed are shown in the illustration of the machine.



NEW CROSS-FEED VENEER SPLICER

What seems to be an important innovation in veneer splicing technique is offered in this new Fisher cross-feed veneer splicer just announced by Plycor Company. It should be of interest not only to plywood manufacturers but also to furniture manufacturers. This unit will edge glue veneers as thin as 1/32 inch and perform an effective flattening operation at the same time. Consequently it is practical for face veneers as well as for crossbanding and center veneers.

In operation, the veneers are prepared in the usual way, preferably on a traveling head veneer jointer. The edges are coated with any one of the special urea resins for veneer splicing which can be obtained from most glue suppliers.

After the glue has become more or less dry, the veneer strips are fed through the splicer with the grain of the wood at right angle to the direction of flow. The veneers emerge as a continuous strip of veneer. A clipper (not a part of the machine) is installed at the outfeed end of the splicer, automatically cutting the veneer to the required width.

The machine has a radically different type of feed mechanism consisting of two transport rail systems which provide a continuous outfeed of glued veneer at a constant speed, infinitely variable from 3′ to 13′ per minute. These same rails provide the necessary edge pressure for gluing the joints without any overlap. Furthermore, it is not necessary to press the strips together manually when feeding. The feed mechanism closes all gaps, even those as wide as 2 inches. The entire veneer surface is heated which results in complete setting of the glue and as the material passes through the rail mechanism it is subjected to a most effective flattening action. The entire operation is said to be smooth, the veneer flowing through at an even speed without jumps or jerks.

One of the greatest advantages offered by this machine is the important saving possible in the splicing of face veneers. It is not recommended for fancy face veneers such as butts and crotches but is recommended for ordinary book matching. However, face veneers do not have to be book matched when run through the Fisher splicer, which results in a great saving of face veneers.

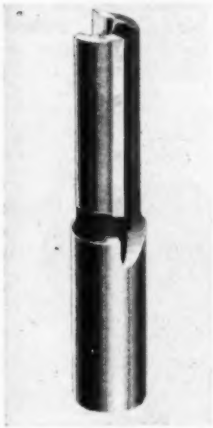
The Fisher model FL-5 veneer splicer is now available in two working widths, 70 inches and 90 inches. Full details may be obtained by writing Plycor Company, division of Earle Hart Woodworking Machine Company, 565 West Washington Blvd., Chicago, Illinois.

OLIVER BORING MACHINE

The Oliver No. 71-DX horizontal boring machine shown in the picture has five horizontal spindles. There are

O. C. E. TRIMMERS ROUTER BITS

O.C.E. Router Bit



Solve the problems encountered in working formica and other plastic covering with CARBIDE TIPPED O.C.E. Tools.

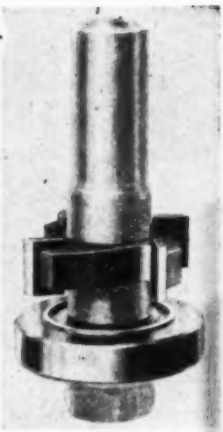
Trimmers—Fit any $\frac{5}{16}$" router spindle. Straight face for flush trimming or 10° taper for self edging.
Router Bits—Double flute $\frac{5}{16}$" to 1" cuts.

Clean, fast trimming of linoleum, plastic, veneer, etc., after gluing. No other finish necessary.

Dealers In Principal Cities

Nationally Distributed By

PRICE and RUTZEBECK
P.O. BOX 30 HAYWARD, CALIFORNIA



O.C.E. Trimmer and ball bearing roller guide. (Spindle not included)

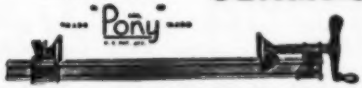
PENOKEE
VENEER COMPANY

MANUFACTURERS OF
ROTARY, SLICED AND HALF-ROUND
VENEERS
IN
BIRCH - MAPLE - BASS - ASH - OAK - ELM - WHITE PINE

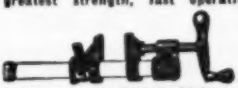
GENERAL OFFICES
MELLEN, WISCONSIN
P. O. BOX 110
Teletype, Mellen 29—Phones 205 - 3313

"Jorgensen" CLAMPS

"Pony"



Style No. 70 "JORGENSEN" I-bar Clamps for greatest strength, fast operation, and economy.

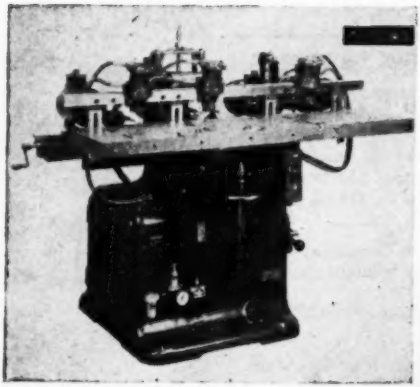


Style No. 50 PONY Fixtures make ideal bar clamps on black pipe — any length.

"JORGENSEN" "C" clamps are built to take hard service, at low cost.

Genuine "JORGENSEN" Handscrews — hard maple jaws, steel spindles. You can depend on them.

ADJUSTABLE CLAMP COMPANY
"The Clamp Folks"
418 N. Ashland Avenue
Chicago 22, Illinois



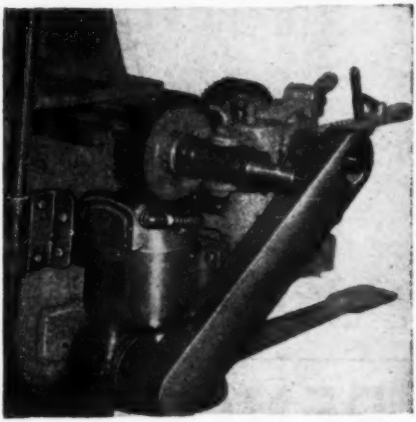
three extra heavy air clamps controlled by an adjustable cam mounted inside the base, and synchronized with the horizontal travel of the bits. They are quick acting and have a special design which helps eliminate the possibility of play in the clamps. The bar on which the clamps are mounted is extra heavy steel and permits the adjustment of the air clamps in any position along the length of the bar. The upright brackets do not interfere with position of the air clamps.

Boring machines now equipped with mechanical clamps can be easily changed over to the new type air clamps, we are told by the manufacturer, the Oliver Machinery Co., Grand Rapids 2, Michigan. The advantage of air clamps over mechanical clamps is that the loading and unloading time is increased in proportion to the boring time.

POWER ATTACHMENT

A power attachment for opening and closing the feed rollers of the McDonough 44" and 54" vertical band resaws has been announced by the McDonough Manufacturing Company, Eau Claire, Wisconsin.

This device consists of a right-angled gear head motor which drives the opening and closing mechanism of the feed rollers through a roller chain and sprocket. The power drive duplicates any hand operation of the feed rollers for any type of sawing such as gauge or center sawing. The mounting of the power drive and switch does not interfere with the tilting of the rolls for bevel sawing. The control switch and mounting which places the switch within easy reach of the operator is included with the attachment.



Manufacturer claims the attachment is easy to install on any McDonough 44" or 54" vertical band resaw now in use. It is necessary to drill and tap three holes, two for attaching the motor plate to the cradle of the resaw and one for attaching the chain guard.

UNI-POINT RADIAL SAW

The newly organized American Woodworking Machinery Co., Hackettstown, N. J., recently announced the purchase of sole rights to the well-known Uni-Point radial saws which they are now manufacturing.

Uni-Point was formerly manufactured by the American Saw Mill Machinery Co. for fifteen years, the sale of which then was under the supervision of those executives who now constitute the new company.

WOODWORKING HEADS • HS WOODWORKING KNIVES

HS ROUTER BITS • WOODWORKING MACHINERY

RUDOLF BASS

HIGH QUALITY - LOW IN PRICE

SIMONDS

New SI-CLONE SAWS

SCIENTIFICALLY HEAT TREATED • ACCURATELY GROUND
CUTS STRAIGHT • FAST • SMOOTH — STAYS SHARP

This complete new line of circular saws UP TO 12" in diameter, will give long, satisfactory service, excellent performance and the most value for the least cost. For use on all makes of table, bench, swing, radial arm and portable electric hand saw machines.

TYPE OF SAW	SIZE	PRICE
Cut-off	6"	$1.75
Rip	7"	2.00
Combination	8"	2.15
52, 54, 60	10"	3.15
Easy Cut	12"	4.35

TYPE OF SAW	SIZE	PRICE
Hollow	6"	$2.75
Ground	8"	3.95
Planer	10"	7.45
	12"	9.95

ALL SAWS SHIPPED POSTPAID EXCEPT C.O.D. ORDERS. SPECIFY BORE WHEN ORDERING. OR IF PORTABLE ELECTRIC SPECIFY MAKE AND MODEL. SEND FOR LITERATURE.

Each saw is individually packaged, in factory-perfect condition, ready for use.

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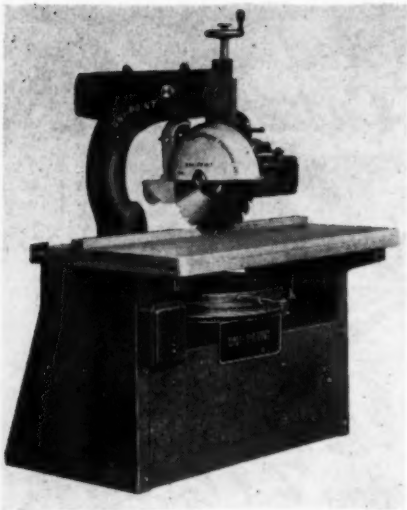


The new company claims that Uni-Point has been further improved and is a radical advancement in power saw machine design by virtue of the fact that, unlike other radial saws, the saw blade, however adjusted for a bevel, miter, or compound miter cross cut angle, always cuts exactly at the same point in the table. This amazing feature eliminates entirely many of the usual time-consuming machine adjustments, while on other machine adjustments and machine setups, time is reduced. This new technique of "one point cutting" (Uni-Point) on general shop work, they claim, will save up to 25%, or more, per-man-hour of production.

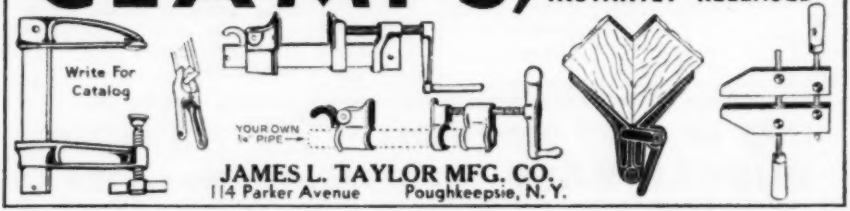
Uni-Point Model X36AF is generally furnished with a 5 h.p. motor and uses a 16" saw blade. Because of the unusually small frame possessed by the specially designed totally enclosed motor, the depth of cut is 5" with a 16" saw. The telescoping ram design moving on floating ladder bearings eliminates the need of a long stationary arm and yet provides the longest possible crosscut capacity, namely 25". Because the saw recedes completely behind the guide fence, the 25" crosscut capacity is the same whether the lumber is 1" or 4" thick. With the ripping capacity 31" and the crosscut capacity 25", ample capacity is provided for ripping or crosscutting 48" panel boards. Uni-Point is also provided with 7½ h.p. motors for heavy ripping when more power is required.

NEW CARBIDE SAW

Cascade Saw & Tool Co., Chehalis, Washington, has announced that they have begun manufacture of a new carbide saw blade. Cascade Saw & Tool has recently been incorporated and in so doing has tremendously increased their manufacturing and engineering facilities. The firm has also installed new grinders and equipment for making and grinding all types of carbide saws and knives.

Cascade Saw & Tool, Inc., has three service shops in the United States and two in Canada to service all types and

CLAMPS, INSTANTLY ADJUSTED INSTANTLY RELEASED



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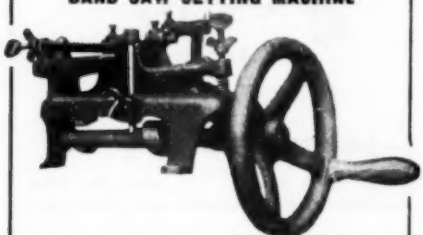
BAND SAW SETTING MACHINE



Simple yet accurate and efficient. Will do more and better work than any other machine of its kind.
The vise takes saw blades ⅛"—1½" in width and by automatically gripping the saw while tooth is being set, prevents twisting of narrow saw blades.
The feed finger is adjustable to teeth with ⅛"—⅝" spacing, point to point.
All adjustments for different widths, teeth etc. are regulated by but two thumbs screws.
Best working speed 100 revolutions (200 teeth) per minute, each revolution setting two teeth. A saw can be set in 4 to 5 minutes.
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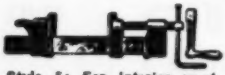

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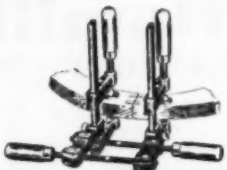

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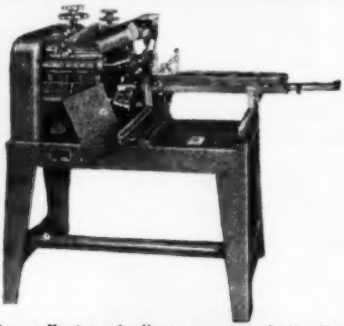

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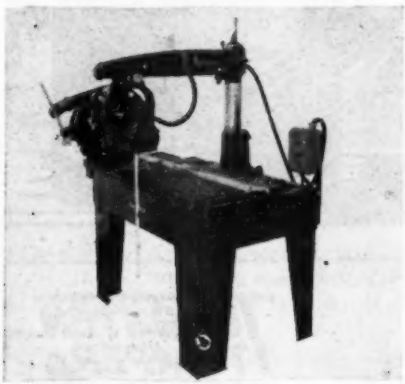
makes of carbide saws. Branch offices are in Santa Rosa, Calif., and Eugene, Oregon.

DE WALT RADIAL ARM SAW

DeWalt, Inc., Lancaster, Pa., recently tested their standard GRR model radial arm machine with a newly-installed 16" saw blade which increases the depth of cut on this machine from 4½" to 5". They report that the machine performed excellently on all operations with the larger size blade—14" blade had formerly been recommended.



The GRR is a 5 h.p., 3 phase, radial arm saw. With the installation of the new 16" blade, it is expected that present users as well as new owners of the GRR will be able to increase their cutting depth by 1".

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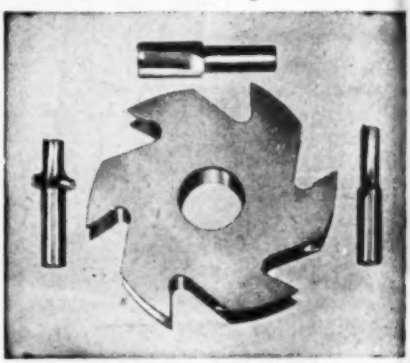

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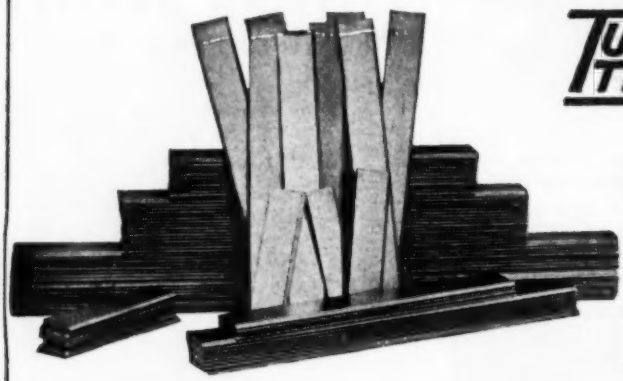

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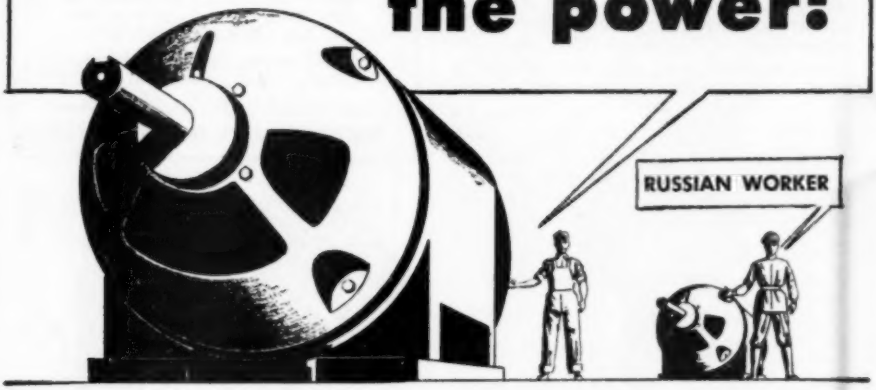

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Back of all this progress in private industry is the American system of competition. In America we do not just compete for public office; we also compete in technology, competency of management, individual initiative and distribution—the latter including selling and advertising in all their varied forms.

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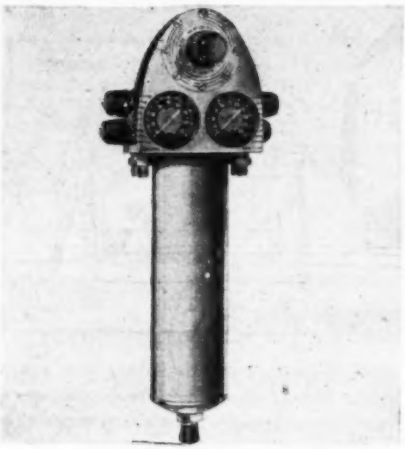

larger regulator, thus giving ease of operation.

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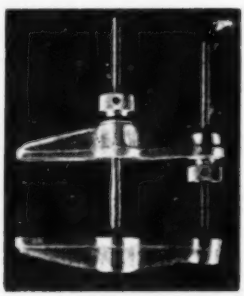

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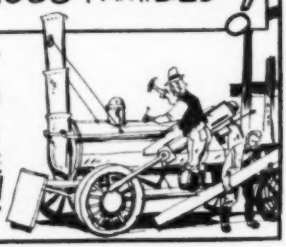

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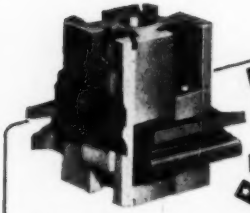

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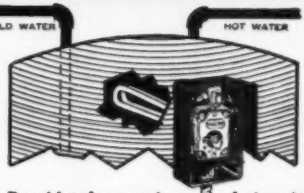

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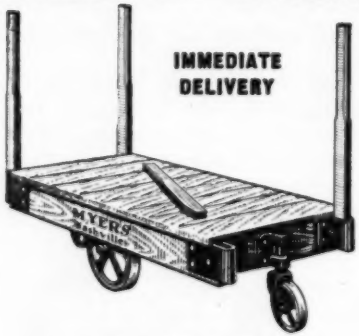

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Whitney No. 395 Double Automatic

Tenoners

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Wilkin Challoner 96x72 D. E. Tenoner

Lathes

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Porter 12" DMD
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Whitney No. 29 40" C.M.D., B.B.

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Wysong & Miles, Oakley, Mattison belt

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Beach Roll Top MD Cap. 104x48
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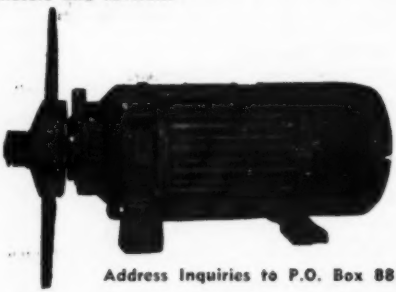

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Whitney No. 234 Double Spindle Electric Shaper
Whitney No. 393 Automatic Single Spindle Shaper
Onsrud W-125 Double Spindle Automatic Shaper
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Clarage Type IE Model II, ball-bearing.

CLAMPS—GLUE ROOM EQUIPMENT
Greenlee No. 899 frame and furniture clamp.
Taylor 6-ft. 12-sec. wheel type clamp carrier.

FILING ROOM MACHINERY
Hanchett No. 608 lap gr. b.b. max. cap. 8" wide.
Black Diamond No. 5 circular saw filer, m.d.

JOINTERS
Yates No. 213 Continuous feed direct M.D.
American No. 1, 24-in. ball-brg. motor drive.
Yates No. 199, 20-in. rd.hd. V-belt m.d.
Porter No. 300 16" Ball Brg. Motor Drive.

LATHES
Fay & Scott Pat. Makers—6' Bed.
Imperial automatic shaping lathe, b.b. m-d.
Oliver 12" x 6' bed speed lathe, d/c mtr. in head.

MORTISERS
New Britain No. 2 Chain, with motor.
Greenlee No. 227 hollow-chisel, belt drive
American No. 20 hollow-chisel motor-drive.

MOULDERS
Woods 10" five-head, all electric
Mattison No. 276—6'x4", all electric.
Mattison No. 226—12"x6", all electric
Yates No. 108, 10" belt dr. coupled motor
Woods No. 132-M 6" Electric.
Y-A No. C-99, 12" BB-DMD
Yates No. C-3 4" fast feed, with motor.
Vonnegut 6" B.B.-D.M.D.

NAILING MACHINES
Auto Nailer "Blue Model" M.D.

PLANERS
Greenlee No. 120-30" Dou. B.B.-D.M.D.
Newman No. 600 24" Sgl. direct motor Dr.
Yates B-2, 36-in. double, motor-drive.
Yates No. 156 20" rd. hd., M.D.
Buss 6A 36" 6-roll single dir. M.D.
Yates No. 177, 30 x 12" double motor drive
American No. 80 15" double, heavy duty
Whitney No. 37-32" Single Ball Brg. M.D.

ROUTERS
Carter Type TR, motor drive 15,000 r.p.m.
Ekstrom-Carlson No. 126, ball brg., motor drive

SHAPERS
American No. 20 double spindle direct motor-drive with frequency changer.
Whitney No. 134 double spindle dir. M.D.
Sidney double ball-bearing short belted M.D.
Whitney No. 165 S.S. motor on arbor.
Onsrud, W-248 single, ball bearing
Whitney No. 282 sgl. D.M.D. 56" x 40" table.

SANDERS
Porter-Cable Oscil. spdl. M.D.
Yates-American 842-31" 2 dr. End. Bed. M.D.
Yates No. 421, 49", 6-drum with motors
Solem No. 370, 43" 2-drum End. Bed.
Fay & Egan 30" 3-drum roll feed
Mattison No. 124, 6-ft. auto. stroke, M.D.
Yates-American No. 7, disc and spindle.
Yates No. 431, 43-in., 3-drum end. bed, M.D.

MITRE SAWS
Tannewitz J-250 Tilting Arbor, direct M.D.
American Dbl. revolving arbor, 5 hp belted mtr.
Whitney No. 77 tilting arbor, direct M.D.
Dodds tilting-table, V-belt, motor drive

CUT-OFF SAWS
Oliver No. 94-D Straight Line.
American No. 51 swing saw, motor-drive.
Greenlee No. 451 auto. cut-off and dado
Buss double cabinet type, motor drive
Porter 43-208 36" stroke, motor on arbor

RIP SAWS
Y-A No. C-50 Gang Rip—50 HP motor.
Sinker-Davis No. 13 power gang, 25-h.p. motor.
Greenlee No. 426 Roll Feed with motor

TENONERS
W-C No. 70 jump dado B.B.-D.M.D.
Greenlee No. 534, tilting spindles, dir. M.D.
American single-end with copes, rolling table
Jenkins No. 95 double end, jump dado, D.M.D.

This is only a partial list—send or call your inquiries

1965 E. Milwaukee — Detroit 11, Michigan

Telephone TRinity 2-6442

"If it's for Woodworking . . . We Have It"

BAND SAWS:
20" American S. M. Mchry. Co.
20" Delta New
30" Fay & Egan No. 155
32" Crescent M.D. Vee Dr. (New)
36" Tannewitz 7½ hp. D.M.D.
36" Fay & Egan No. 345 and No. 50

BAND RESAWS:
Mershon 44" Vert. Band Resaw
Yates V-4 54" L.H. Vert. M.D.
Fisher 40" Vertical
Connell & Dengler 60" $1500.

BORING MACHINES:
American—Clement 2 spindle Hor. Radial Bore
Andrews 72" Ball Br. Vert. Power Feed 8 Spdl.
Fay & Egan No. 312 Vert. 48" cap. 6 Spdl.
Fay & Egan Vert., 6 spindle Borer, 36" Capacity
Root Sgl. Spindle Motor on Spdl.

BOX MAKERS MACHINERY:
Tidey Box Makers Rip Saw
Doig 18 track C.B. Cleater
Doig 3 track C.B. Nailer

CLAMPING MACHINES:
Hayes Power Door Clamp
Lancaster Pneumatic Chair Clamp prac. new ⅓ price
Laidlaw 3½"x8 Door Clamp $250.

CUT OFF SAWS:
Comet T-C-16 10 hp. 44" blade
Greenlee No. 453 C.O. Automatic

DOVE TAIL:
Dodd 15 spdl. M.D. rebuilt like new

DOWEL MACHINES:
Hawker No. 2
Hawker No. 3
Fay & Egan No. 406 Rod Machine

JIG SAWS:
Oliver No. 173-B B.B. M.D.
Jones Superior No. 46 Self Contained M.D.
Beach No. 1 Ceiling Suspension

JOINTERS:
Crescent 8" H.D. Ball Br. D.M.D
Crescent 16" Ball Br. Vee Dr.
Crescent 18" Ball Br. Vee Dr.
Fay & Egan No. 61 24" $275
Moak 12" new D.M.D.
Porter No. 300-C 24" Ball Brg. Jointer, 4 knife head with 10 h.p. 3 ph. D.M.D., used less than 3 months

LATHES:
Mattison No. 55—Automatic

MORTISERS:
American Hor. H.C. Auto Feed
Yates-Amer. No. 25K Motor Spindle
Crescent Ball Br. Motor built in
New Britain No. 4—Chain Mortisers
New Britain No. 3 and 4 Chain Mortiser
Wysong & Miles No. 134 H. C. $200.00

MOULDERS:
Hermance No. 50—12" Babbitted Bearing
American 4" 4 side Moulder P. B.
American 6" No. 3 H.D.
Fay & Egan No. 184 12" P.B.
American No. 505 10" P. B.
S. A. Woods No. 132-M 6" Electric Moulder

NAILING MACHINES:
Doig 18 track Cleater M.D.
Doig 3 track C. B. Nailer
Gramme 4 tr. Cigar Box Nailer

PLANERS—DOUBLE:
American No. 4—27"x7" Double
American No. 6½—27"x7" P.B.
Berlin No. 175 30"x12"

PLANERS—SINGLE:
American No. 4½ 30" x 7"
American No. 444 30" x 7"
Buss No. 208 20"x8" New
Buss No. 248 24"x8" New
Solem 12"x3" D.M.D.
American No. 1 20"x6"
Crescent No. 124 24"x6" P. B
Crescent 26"x8"
American No. 4½—27"x7"
Crescent 26"x8" Var. Feed
American No. 112 24"x8"
Powermatic 12"—16"—20" (New)

PLANING MILL EXHAUSTER FANS:
60" Sturtevant Dbl. Ball Bearing - ½ price
55" Sterling Dbl. Ball Bearing - ½ price
60" American Sgl.
20" - 25" 30" - 35" and 40" Sgl. P.B.

RADIAL SAWS:
New Delta Multiplex No. 20A-30A-40A-50A-50C (new)
New Skil Radial Saw, 5 hp., 3 phase
Comet—¾ h.p., 1 phase (New)
Walker Turner 1½ hp., 3 hp., 3 ph.

RIP SAWS:
Hall & Brown Self Feed, Ball Bearing DMD
American No. 2 Power Feed
Yates G-2 St. Line Ripper
Yates No. 281 42" Band Rip
Falls St. Line Ball Br. M.D.
Fay & Egan Heavy 10" cap. Hand Feed
L. Power & Co., Self Feed, Belt or Motor

ROUTERS:
Kelley 3 ph. Stair Router
Hunter 1 ph. Stair Router, $50
Duro 1 ph. Floor Type

SANDERS:
Yates No. 491 42" 3 dr. Roll Feed
American Col. 48" 3 drum
Amer.-Columbia 42" 3 dr.
Smith 30" 3 dr. Endless Bed Belt Dr.
Mattison No. 115 Variety Belt Sander
Yates-Amer. Comb. 15" Disc and Drum
Beach No. 201 New Belt Sander
American No. 15 24" and 36" Sgl. Drum
Porter Cable Spindle Sander
Fay & Egan No. 225 48" 3 dr.
Wysong & Miles No. 257—Belt Sander
Wysong & Miles No. 171 Belt

SASH MACHINES:
Greenlee No. 604 Sash Relisher
American No. 1 Combination Sash Jointer-Sander

SASH & DOOR MACHINERY
American No. 7 2 side Door Sticker
American No. 3 4" 2 side Sash Sticker, P.B. attach
American Sash DoveTail Machine
American Sash Relisher
Hayes 4 Spl. Stile Boring Machine
American Comb. No. 1 Sash Jointer & Sander

STICKERS:
Hayes 2 side Shimer Heads
American 2 side Door Sticker

SHAPERS:
Fay & Egan No. 253 Sgl. Spl. Ball Br.
American Sgl. Ball Br. M.D.
Fay & Egan No. 265 Double spdl.
Anderson Double Motors on spindles
Delta Floor Type
Walker Turner No. S-1140

TENONERS:
Smith Dbl. End 2 Copes & C. O. Saw Bab. Brg., B.D
Egan, Sgl., 2 Copes—$275.00
American S. E. No. 5 Copes C.O. Saw
American No. 1 Sgl. w. copes & C.O. Saw
Fay & Egan No. 2 Single w. copes

TIMBER SIZER:
S. A. Woods No. 8, 16" x 30" Sizer
Yates P-12 20"x12" 4 side M.D.

ERVIN MACHINERY CO., INC.
124-26-28 Boulevard of Allies Pittsburgh, Pennsylvania

GOOD MACHINES TRUTHFULLY REPRESENTED

Wilkin-Challener No. 703 Automatic Plow and Bore Machine
Marcon-Johnson 80"x56" DMD BB Double End Tenoner
Jenkins Model EG—96"x40" Belt Drive Double End Tenoner
Hoyes 102"x60" Double End Tenoner
Crescent Ball Bearing Electric Single End Tenoner
Hermance Belt Drive Single End Tenoner
American No. 1 Single End Tenoner
Mattison No. 55-C—30" Ball Bearing Automatic Shaping Lathe
Mattison No. 57-D—42" Ball Bearing Automatic Shaping Lathe
Jenkins No. 65 Ball Bearing Sash and Door Sticker
Mattison No. 229 - 10" Ball Bearing Electric Moulder
Vonnegut 6" Ball Bearing Electric Moulder
Jones-Superior No. 35 Two Spindle Horizontal Borer
Frank H. Clement Two Spindle Radial Sawing Machine
Wysong & Miles No. 283-B Single Spindle Borer
Solem S3-M—49" BB Three Drum Endless Bed Sander
Solem No. 370 - 30" Two Drum Endless Bed Sander
Wysong & Miles No. 171 Hand Block Moulding Sander
Jones-Superior No. 145—30" Disc Sander
Buss Double Cut-Off Saw
Tannewitz 42" Ball Bearing Band Saw
Wilkin-Challener No. 60—72"x72" Electric Ball Bearing Double End Tenoner
Greenlee No. 110—36" BB, DMD Single Planer
Whitney No. 24—30" BB Double Head Cabinet Planer
Whitney No. 39-A DMD BB Double Spindle Shaper
Advance Double Spindle Shaper
Buss No. 8 BB Double Spindle Shaper
Mattison No. 244 BB Cut-Off Saw
Billstrom 7' 29 Section Clamp Carrier
Taylor 19 Section Revolving Clamp Carrier

O'LEARY & FLYNN

ROOM 1806 **666 N. LAKE SHORE DRIVE** **CHICAGO 11, ILLINOIS**

REBUILT AND USED MACHINES

BAND SAWS
Colladay 36" Motor Driven
Crescent 38", cast iron wheels
BORERS
Root "GM" Vertical Single Sp.
American No. 1, 2-Sp. Horiz. Radial
Keystone 3-Sp. Horiz. 1" centers
CARVER
Gallmeyer & Livingston Single Sp.
CLAMP CARRIERS
Taylor 7½' 30-Sec. Chain Type
Taylor 7½' 40-Sec. Chain Type
DOVETAILER
Dodds 12-Spindle, spiral gear
GLUING MACHINES
Bell 72" Plate Edge Gluer
Black 5-Gal. Portable Resin Mixer
Black 30-Gal. Cold Resin Mixer
Black 50" Double Resin Spreader
JOINTERS
6", 12", 16", and 20" Sizes
Y-A No. 1, 12" Ball Bearing, M.D.
30" with Billstrom Feeding Attachment
Yates Continuous Feed Glue Jointer
Diehl No. 60 Continuous Feed Glue Jointer
LATHES
Imperial Auto. Turning, D.M.D.
Mattison No. 55C Ball Bearing Auto. Turning
MORTISERS
Wysong & Miles No. 284 Auto. Hollow Chisel
Fay & Egan No. 462 P.F. Hollow Chisel
American No. 20 P.F. Hollow Chisel
Sidney F.F. Vertical Hollow Chisel
MOULDERS
Smithway "XL" 4" Ball Bearing, M.D.
Hermance 6" 4-Side
4" & 6" Single Head Stickers
Hermance No. 50, 8" Ball Bearing, 4-Side
PLANERS
Yates No. 152, 24" Single, M.D.
Buss 30" & 36" Single, M.D.
Whitney 30" Dbl., 8 feed rolls
ROUTERS
Onsrud W-240 High Speed Elec.
SANDERS
Fay & Egan 48" 3-Dr. Endless Bed
Nash No. 65 Automatic Turning
Wysong & Miles No. 173 Univ. Belt
Curtis No. 11 Semi-Auto. Belt Sander
SAWS - CUT-OFF
Porter Floor Type, with Table
Y-A C-44 Floor Type, with Table
Bell No. 12 Double Miter
Root & Beach Double Cut-Off
SAWS - SELF-FEED
Hermance No. 31 Adjustable Roll
Greenlee No. 426 - Root - American
SAW TABLES
Tannewitz SJ Tilting Arbor
American Dbl. Revol. Arbor
American No. 7½ Comb. & Dado
Oliver No. 232-D Ball Bearing Tilt Arbor
SHAPERS
Porter No. 200 SVM Single, M.D.
Whitney No. 165 Ball Bearing Single
Onsrud WA-50 Automatic
Whitney No. 134 Ball Bearing Double
Whitney No. 139 Ball Bearing Double
FREQUENCY CHANGER 50 KW 60/100 cycles
TENONERS
Power Single End, Motor Driven
Colladay, Fay & Egan, American
VENEER MACHINERY
Capital 150" Veneer Clipper
Jenkins No. 23 DMD, Ball Bearing Jointer

B. M. ROOT CO., YORK, PA.

TOP VALUES

Earle Hart's USED AND REBUILT WOODWORKING MACHINERY

ROCK BOTTOM PRICES

* Indicates Ball-Bearing and Motor Driven

BORERS—Horizontal & Vertical
Indiana 15-H two-spindle horiz. radial borer.
* Oliver No. 71—4 spindle horizontal borer.
Greenlee No. 368-30" Mult. Horiz. Borer.
Andrew 48" & 72" Mult. Horiz. Borer.
* Wysong & Miles No. 283-B Vert. Sgl. Spl. Borer.
* Greenlee No. 386 4-ft. Vert. Multiple Borer.
Andrews 60" multiple vertical borer.

CHAIR MACHINERY
* Bell No. 100 front and back post borer.
* McKnight 4CM horiz. and vert. borer.
* McKnight double end sawing and boring machine.
McKnight No. 1E saddle seat machine.
Bell No. 8 dowel gluer and driver.
Dauber-Bell dowel cutter and pointer.
McKnight chair benders, complete.

CLAMPING MACHINERY
Taylor-Bilistorm-Black 12-30-40 and 60-sec. carrier
Handy No. 447 Air Operated, 2-way End Clamp.
Handy and Union revolving case clamps.

GLUE MIXERS & SPREADERS
Francis M-7 (75 gallons) Veg. Glue Mixer.
Union 36" and 60" Dbl. Roll Resin Glue Spreaders.
Francis 12-in. and 18-in. edge glue spreaders.

JOINTERS
* Fay & Egan No. 506—12" hand jointer.
* Yates-American No. 213 glue jointer.
* Jenkins No. 343-A glue jointer.
* Diehl No. 60 glue jointer.

LATHES
* Mattison No. 55 C Auto. Turning Lathe, b.b.
* Yates-American T-5 auto. turning lathe.
Mattison No. 210 copying lathe.

MORTISERS
* Greenlee No. 227 automatic hollow chisel mortiser.
New Britain Nos. 2 and 7 chain saw mortiser.
* Whitney No. 67 horiz. osc. bit mortiser.

MOULDERS
* Oliver No. 202—4-in. electric moulder.
* Mattison No. 276—6-in. electric moulder.
* Vonnegut 6-in. electric moulder.
* Yates No. 108—10 in. heavy-duty moulder.
* Yates-American C-99 12-in. electric moulder.
Yates C3A-4" belt drive moulder.

PLANERS—Facing
* Whitney No. 32—30-in. single planer.
* Porter 24-in. facing planer—Herzog feed.

PLANERS and MATCHERS
* Stetson Ross 6-10-A 15-in. electric matcher.
* Crescent P-24—24-in. single planer.
* Buss 4-A 30-in. single planer.
* Whitney No. 29—36-in. single planer.
* Whitney No. 24—30-in. and 36-in. double planer.
* Whitney No. 33 32-in. heavy duty double planer.

ROUTERS
* Onsrud W-240 heavy duty electric router.
* Porter No. 600 and 610 heavy duty elec. routers.

DRUM SANDERS
* Smith No. 404B—42-in. 3-drum endless bed sander.
Yates No. 431—43-in. 3-Dr. end. bed mtrzd.
* Solem S 3-M 73-in. 3-drum endless bed sander.
American No. 9—61-in. 3-drum roll feed, mtrzd.

SANDERS—Belt & Miscellaneous
* Wysong & Miles No. 294 auto. stroke sander.
Mattison No. 124 auto. stroke sander.
* Wysong & Miles No. 277 hand block belt sander.
Nash No. 10 & No. 25 auto. spindle sanders.
American No. 11 horiz. surface sander.

SAWS—Band Scroll & Resaws
* Tannewitz Type G, 36-in. band scroll saw.
* Fay & Egan No. 50—36-in. band saw.
* McDonough 44-in. vertical band resaw.
* Bell 12B double cut-off and miter saw.

SAWS—Cut-Off
* Porter 43-208 straight-line cut-off saw
* Yates-American G-44 straight line cut-off saw.
* Monarch 36AF radial arm saw.
* Jenkins No. 105-A dbl. cut-off and mitre.
* Bell 12B double cut-off and miter saw.

SAWS—Rip
* Diehl No. 75 straight line ripsaw.
* Mattison 207 straight line ripsaw.
* Yates-American G-77 straight line ripsaw.
* Yates-American G-50 heavy duty ripsaw.
Greenlee No. 426 self feed ripsaw.

SASH & DOOR MACHINES
Bell No. 5-B stile and rail borer.
* Bell No. 11 power door clamp.
Bell No. 7 dowel driver and gluer.

VARIETY SAWS
* Eaglesfield tilting arbor variety saw.
* Fay & Egan No. 500 tilt-table variety saw.
* Baker double arbor variety saw, b.b.
* Yates-American No. 8 saw and dado machine.

SHAPERS
* NEW Crescent No. S-2 single spindle shaper.
* Porter No. 103 single spindle shaper.
* Porter No. 201 double spindle shaper.
* Greenlee No. 180 double spindle shaper.
* Whitney No. 351 double spindle, 12½ HP motors.
* Whitney No. 295 automatic, double spindle shaper.
* Onsrud No. 124 automatic single spindle shaper.
* Onsrud WB-85 auto. dbl. spdle. shaper

TENONERS
* Greenlee No. 530 and 534 single end tenoners, b.b.
* Wilkin-Challoner No. 70 - 96-in. dble. end tenoner
* Jenkins No. 95—96-in. double end tenoner.
Jenkins No. 96 60-in. double end tenoner, b.b.
* Greenlee No. 545—90 inch double end tenoner.

VENEER EQUIPMENT
Dennis No. 2 veneer taper.
Francis 36"x84" hyd. veneer presses.
Merritt 84x54—8—10—12 plate redriers.
Large quantity "I" beams and turnbuckles.

MISCELLANEOUS MACHINES
* Hanchett GK 36-in. auto. knife grinder.
Food Machinery Co. Model AC-2 boxmaker.
* Woods No. 227 side head grinder.
NEW Hanchett No. 133 auto. band resaw sharpener.

This is only a partial list. If the machine you want is not shown, write us.

THE "HART" LINE

Earle Hart WOODWORKING MACHINE COMPANY

565 WEST WASHINGTON BOULEVARD CHICAGO 6, ILL. RAndolph 6-4970

GUARANTEED BY GAYNES

AIR COMPRESSORS
New and Rebuilt, all sizes
Quincy ¾ HP single stage, tank mounted
Chicago Pneu. 9 x 8 Horiz., 173 C.F.M. with tank, M.D.

BORERS
Yates-Amer. No. 1 Sgl. Spdl., Horiz., B.B., D.M.D.
2-spindle Radial, 1-10", 1-18" cap., Motorized

CLAMPS & CLAMP CARRIERS
Taylor 8-section, 7'6" cap. Clamp Carrier
Taylor 12-section, 12' capacity Clamp Carrier
Taylor 40-section 7' cap. Clamp Carrier
Billstrom 39-sec. 6'6" cap. Clamp Carrier, Power Drive

JOINTERS
Union 6", B.B., D.M.D.
Towsley 10", B.B., D.M.D.
Monk 16", B.B., D.M.D.
Jenkins No. 343A Glue Jointer, B.B., D.M.D.
Porter 24", B.B., Facer with Herzog 4-post Feeder, M.D.

MORTISERS
Loeffler No. 609, Motor Driven
Sidney Hollow Chisel, B.B., D.M.D.
Greenlee No. 227 Hollow Chisel B.B., D.M.D.
New Britain No. 2 Chain, M.D.

PLANERS
Yates No. 156-30" Single Cabinet, B.B., D.M.D.
Whitney 30" Single Cabinet, B.B., D.M.D.
Whitney 40" Single Cabinet, B.B., D.M.D.

ROUTERS
Onsrud No. 240-D, B.B., M.D.

SANDERS
Solem 83M 42" 3-drum End. Bed, B.B., D.M.D.
Smith 42", 3-drum End. Bed., B.B., D.M.D.
American No. 9, 3-drum, 61" Roll Feed, D.M.D.
Mattison No. 124, 6' Auto. Stroke, M.D.
Mattison No. 138B Hand Block, B.B., M.D.
Porter-Cable No. S-3, 10", Belt, B.B., D.M.D.
Mattison No. 172 Edge Belt, M.D.
Ecco No. 111 Edge Belt Sander, B.B., D.M.D.
Fay & Egan 16" Horizontal Belt, M.D.

SAWS
Crescent 36" Band Saw, BB., D.M.D.
American No. 110, 54" Band Resaw, BB, DMD
Porter C-43 Cut-off Saw, B.B., D.M.D.
Diehl No 75 Chain Feed Rip Saw, B.B., D.M.D.
Mattison No. 207 Chain Feed Rip Saw, B.B., D.M.D.
Bell No. 12C Double Mitre Saw, B.B., D.M.D.
Nash No. 4 Double Cut-off & Chuck, B.B., M.D.
Oliver No. 232 Tilt Arbor Saw, B.B., D.M.D.
Bell No. 16, B.B., M.D. (new)
H & A No 55 Swing Saw, B.D., M.D.

SHAPERS
Crescent No. S-5 Single Spindle, B.B., mtrzd.
Sidney 2-spindle, B.B., motorized
Porter Buck Shaper, B.B., M.D.

MISCELLANEOUS
Morgan 16-track Nailer, open back, with clincher
Mattison No. 55C Automatic Lathe, B.B., M.D.
Jenkins Three-in-One Machine, M.D.
Fay & Egan No. 401B Double End Crate Tenoner

GAYNES ENGINEERING COMPANY

1642 W. FULTON ST. PHONE: HAymarket 1-5257 - 5258 CHICAGO 12, ILLINOIS

GUARANTEED USED MACHINERY

Borer Greenlee No. 368—4 Spindle M.D.
Cut-off Saw, Crescent Str. Line 5 HP motor
Jointers, Delta 8" Sidney 16", M.D.
Jointer, 8 and 10" H&B 8" New Delta & Boice Crane
Lock Corner Cutter, Morgan, with cutters, single end
Mortiser, Hollow Chisel, Hall & Brown No. 208, M.D.
Moulder, Yates No. C-3—4"-4 side
Nailers, Morgan 6 & 8 Track and No. 9-9 Track Open Back
Planers, single, Fay & Egan 24x6"
Thickness Planer, New Delta 13x5"
Planer single American 30x8" Belt Drive
Planers 12x4" Parks 13x6 Barton 10" Red Fox
Planer, Double, Whitney 30x7"—6 roll, 4 knife round cylinder, 40 H.P., top head, 25 bottom head, 3 H.P. feed, sectional roll and chipbreaker, babbitt bearing.
Planer & Matcher, Hall & Brown No. 209, 15x6" Double Profiler
New Powermatic 16x6", Delta 13x3", Powermatic 12"x4", all motor driven
Router, Yates-American U-900—1½ HP motor
Router, Onsrud No. W-240—7½ HP, 2 speeds
Saddle Seat Machine, McKnight
Sander, belt, hand block, Mattison & Fay & Egan
Sander, 49"—3 drum, roll feed Fay & Egan No. 225, M.D.
Sander, Belt, Auto. Stroke, Curtis 6'
Band Saw, Cresceent 36" with motor
Band Saws, Union 20", M.D., New Delta 20", M.D.
Band Saw, Tannewitz No. G1-36"—32" underguide, M.D.
Band Resaw 54" Mershon Standard with 35 HP motor
Chain Feed Rip Saw Yates-American No. 67-15 HP Motor
Beach 6 & 8 ft. Carriage Cut-Off Saw
Radial Saw, DeWalt Victory, model 5, HP
Radial Saw, New Delta No. 50-C—5 H.P.
Rip Saw, XL Roll Feed, 10 HP motor
Rip Saw, Chain Feed, Diehl No. 55, 10 HP motor
Delta 12" Tilting Arbor Saw, 5 HP motor, New
Darra-James 12" tilt Arbor Saw, New & Used
Swing Saw Eaglesfield motor drive
Shaper, single spindle Fay & Egan, 5 H.P. motor
Delta and Boice-Crane Shapers, 3 phase motors
Shaper DBL. Spindle Whitney with Frequency Changer.
Tenoner, single end, American No. 2½, Hall & Brown No. 55
Tenoner, double end, Wilkins-Challoner 120" with copes and cut-off saw, with motor
Veneer Press Francis 24"x96"—15 screws

Send us your inquiries for any machines not listed.

McDONALD MACHINERY CO.

1535 N. BROADWAY CE. 9360 ST. LOUIS 6, MO.

SCOTCH PRICES

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Bandsaw, with resaw attach., F. & E. No. 146, 42", 20 h.p., ballb. mtr.
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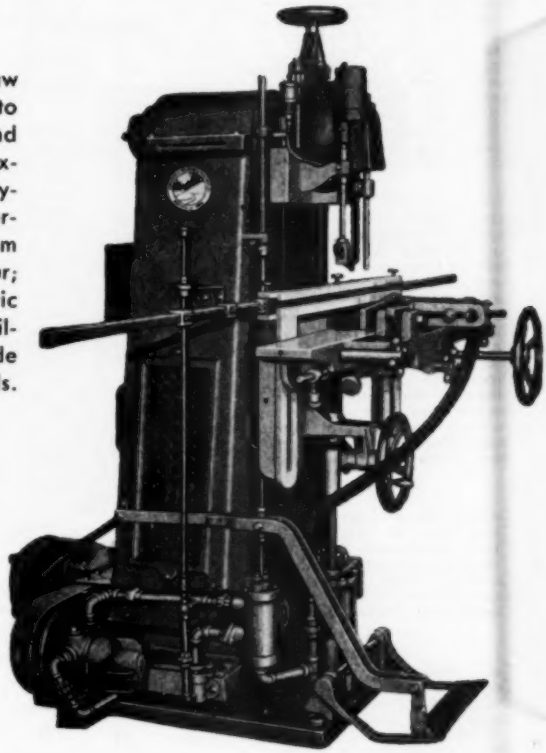

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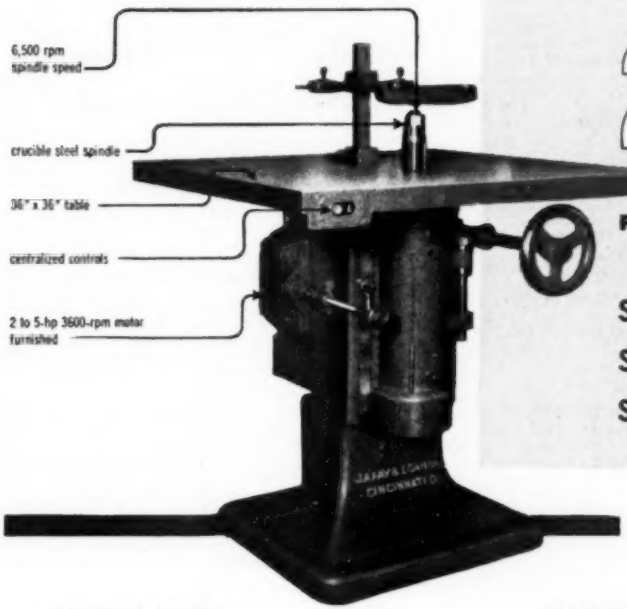

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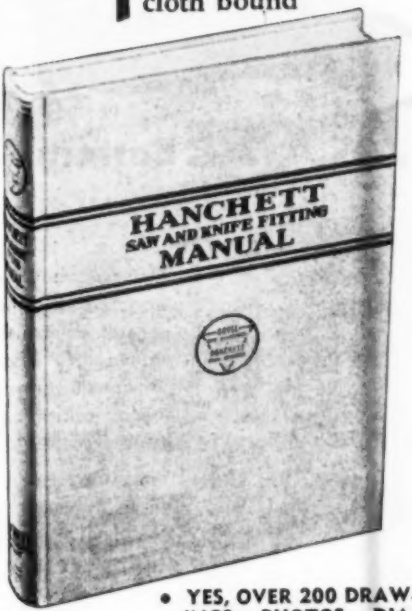

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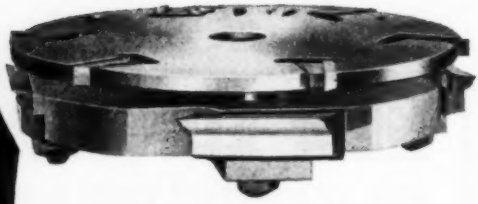

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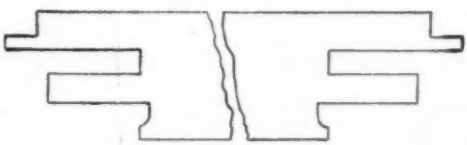

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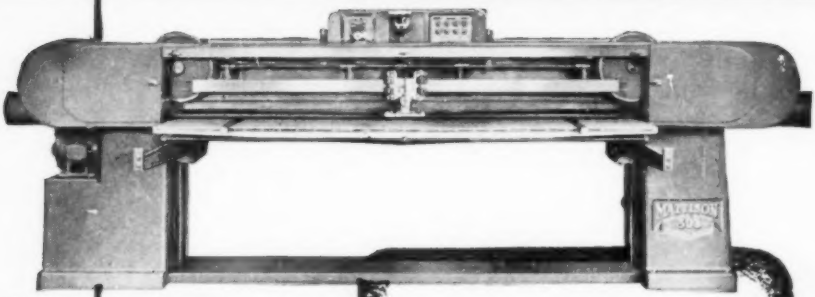

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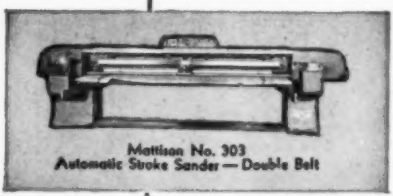
Automatic Stroke Sander — Single Belt



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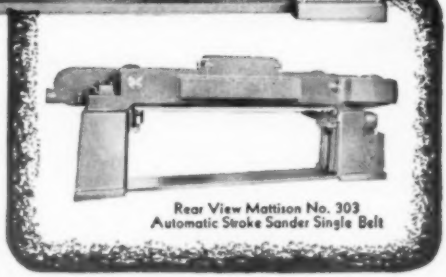

Rear View Mattison No. 303
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